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For NOVEMBER, 1945

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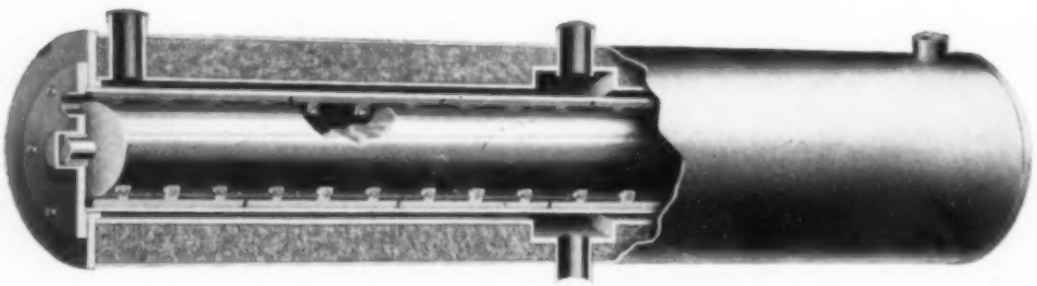

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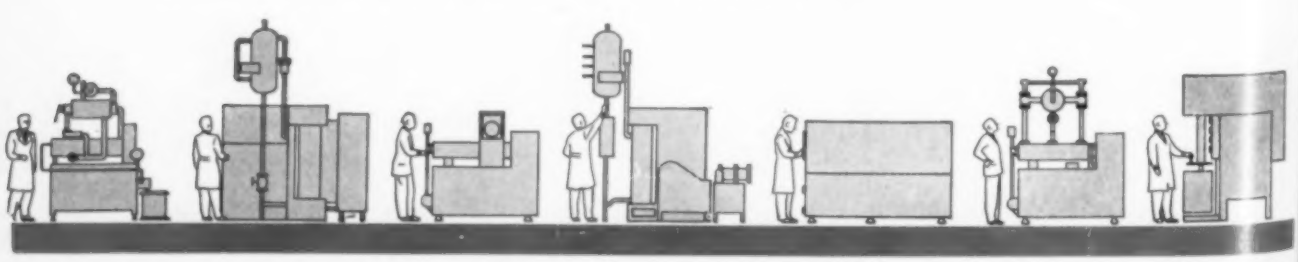

CHEMICAL & Metallurgical ENGINEERING

NOVEMBER • 1945

Volume 52 Number 11

In this Issue

Science, Politics and Humanity 95
EDITORIAL FOREWORD

Ethyl Alcohol Made From Refinery Ethylene 96
EDITORIAL STAFF

Policy Battles Back of the Proposed Research Foundation 99
By R. S. McBRIDE

Science vs. Politics 101

High Vacuum Measurement With the McLeod Gage 102
By EARL FLOSDORF

Recognize Veterans for What They're Worth 105
By ERNEST W. FAIR

Unique Plant Produces Tung and Peanut Oils 106
By D. GORDON

Pilot Plant for Study of Unit Operations 108

Sulphur—Important Material in Two World Wars 110
By W. W. DUECKER

Properties and Applications of Saran Pipe 112
By D. R. WILLIAMS

***Chem. & Met.* Plant Notebook** 116

Handling Materials With Lifting, Tiering and Special Trucks 119
A *CHEM. & MET.* REPORT

Alcohol From Petroleum 136
A *CHEM. & MET.* PICTURED FLOWSHEET

WATCHING WASHINGTON	82	INDUSTRIAL NOTES	252
EDITORIALS	114	CONVENTION PAPERS	256
EQUIPMENT NEWS	131	FOREIGN ABSTRACTS	280
NEW PRODUCTS	143	BOOK REVIEWS	285
NEWS	151	GOVERNMENT PUBLICATIONS	298
PACIFIC PROCESS INDUSTRIES	164	MANUFACTURERS' PUBLICATIONS	300
FOREIGN NEWS	176	ECONOMICS	307
GERMAN CHEMICAL INDUSTRIES	188	PRODUCTION TRENDS	308
CORROSION FORUM	231	PRODUCTION DATA	310
LOG OF EXPERIENCE	237	PRICES	312
PERSONALS	241	NEW CONSTRUCTION	316

AN INDEX TO ADVERTISERS WILL BE FOUND ON PAGE 494

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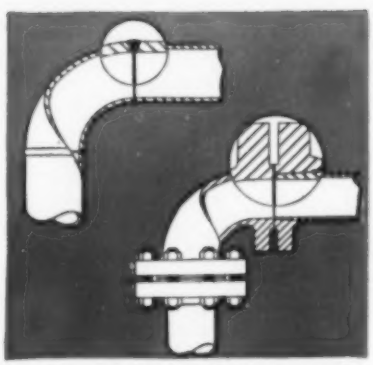

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ESTABLISHED 1902 S. D. KIRKPATRICK, Editor

NOVEMBER, 1945

Science, Politics and Humanity

IN concluding his history-making report to the War Department on the atomic bomb, Professor Henry DeWolf Smyth wrote: "If men, working together, can solve the mysteries of the universe, they can also solve the problems of human relations on this planet. Not only in science, but now in all human relations, we must work together with free minds." Unheeded at that time, by most of us, these words of sound advice are worth recalling now that scientists and engineers find themselves at the very storm center of a hurricane of political debate and discussion that is sweeping over the entire country. Never before in history has science been asked, and expected, to do so much for humanity.

Human relations itself is an all-pervading science. It seems to have a bearing not only on the control of the atomic bomb, but on nearly every problem we face as a nation. Certainly nothing is more fundamental in labor-management negotiations than an understanding of the other fellow's viewpoint and principles. To reconcile the conflicts that have developed over the pending legislation on governmental support for science and research calls for knowledge of people and politics as well as of facts and figures. The question of universal military training cannot be decided solely on the basis of the manpower needs of future armies and navies. The technical profession must help to formulate some more effective means by which more young men and women can be trained so that their training can best be used for the public good in the event of another military emergency.

We are particularly concerned with how these trained brains can be conserved for essential research and development work. Our record on this problem in World War II has been worse than that of any other important nation. If Selective Service is permitted to continue to draft the highly trained technical personnel that is now sorely needed in our plants and laboratories, we will have seriously retarded reconversion and reconstruction. So here is both an immediate and long-range program where those of us who know the facts must see that they are properly interpreted in the public interest.

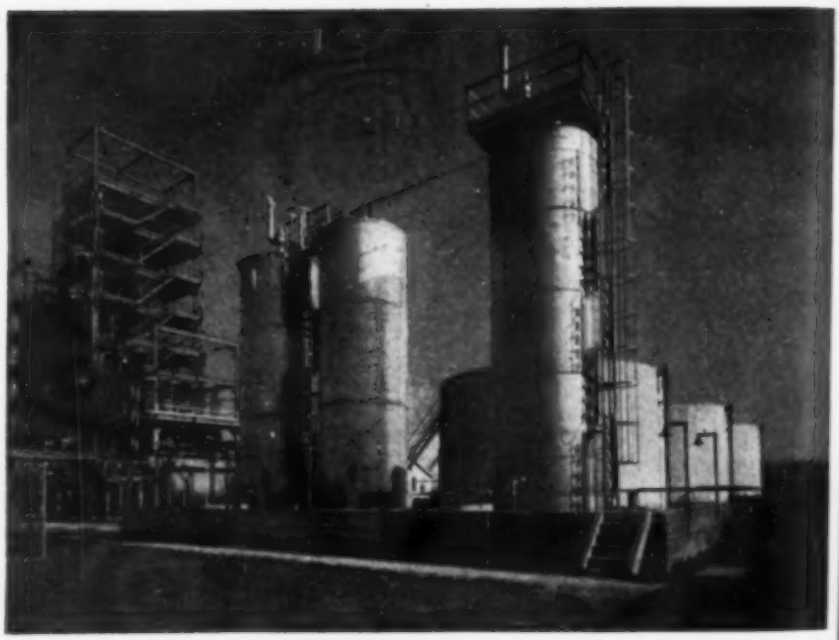
Some wag has said that with the release of atomic energy, all scientists want to become politicians, and all politicians, scientists. On their record to date, the scientists have been none too successful with their political proposals while the politicians seem to have increasing difficulty in organizing their facts—scientific and otherwise. The international politician turns into a rank isolationist when asked about any sharing of the "bomb secrets." The scientist, on the other hand, emerges from his monastic isolation suddenly to become a rabid internationalist, who would give away his national sovereignty. Peter Edson, in a recent newspaper column, told how Congress was trying to mix "pure" science with "pure" politics (if such there be) in order to synthesize for tomorrow's taxpayer a brave new world of research. If the experiment failed, he felt sure that it would be due to "impurities" in one or the other of the two reagents. This leads us to wonder whether "pure" science can mix with "impure" politics—and with what result?

Now is no time for idle talk that might revive and intensify the traditional conflict between the scientist and the politician. Rather there must be more intimate knowledge and sympathetic understanding on both sides. In Professor Smyth's words, "we must work together with free minds." Not only our own future, but that of humanity itself, may well be decided by the way we solve these political problems.

EDITORIAL STAFF

ETHYL ALCOHOL
Made From Refinery Ethylene

Ethylene from the cracking of petroleum hydrocarbons is generally considered to be the cheapest source of ethyl alcohol. Because of the large volume consumed by the process industries chemical engineers will be interested in Standard Oil's Baton Rouge plant. It is the first ethyl alcohol plant in the world to be operated by a petroleum refinery. A feature of the plant which will be of particular interest to users of sulphuric acid is the Simonson-Mantius concentration system. Three Dowtherm vaporizers supply the heat. They represent the largest single installation of this type of vaporizer.—*Editors*



In finishing the alcohol, ether is removed in the ether column. Prior to shipments, the ether is condensed and conveyed to storage shown here at the Baton Rouge plant of the Standard Oil Co. (New Jersey)

Prior to 1935 ethyl alcohol was produced commercially only by fermentation of starches and sugars. Then one company got into commercial production of ethyl alcohol made directly by hydrating ethylene produced from oil. In 1935 the Standard Alcohol Co. started to operate a pilot plant to perfect a process it had developed in the laboratory to produce ethyl alcohol from refinery ethylene. The basis of the process is, of course, the hydration of the ethylene.

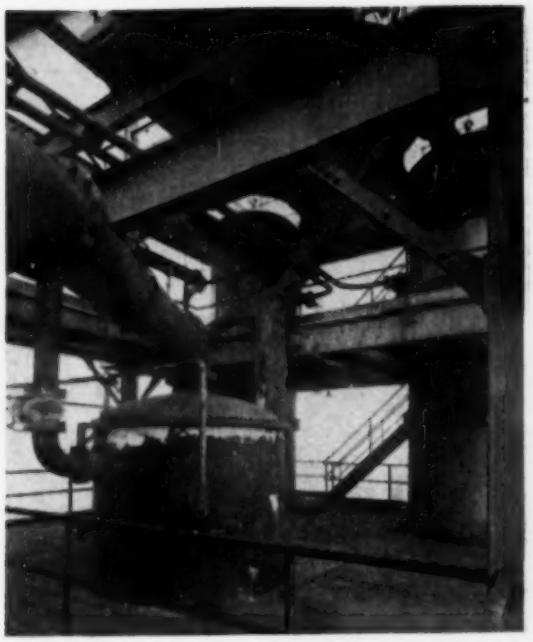
After several years of development the Standard Alcohol Co. and the Standard Oil Development Co., subsidiaries of the Standard Oil Co. (New Jersey), designed and erected a plant to produce ethyl alcohol from ethylene adjacent to the Baton Rouge refinery of the Standard Oil Co. of Louisiana. It was completed and began the production of 190-192 proof ethyl alcohol in March 1943. The alcohol plant is roughly divided into three sections: (1) The crude alcohol producing, (2) the finishing, and (3) the denaturing and handling.

The average petroleum refinery employs mixtures of ethylene with other byproduct gases as fuel for boilers. As a rule a refinery does not produce this gas except in low concentration in other gases, and to make it in quantity calls for adjustment in the usual refinery practices. This is quite important in the production of ethyl alcohol, because if the proper amount of ethylene is not produced as scheduled, the alcohol plant cannot operate on a definite timetable. A special cracking plant in the Baton Rouge refinery was adjusted to supply the required amount of ethylene, producing it from special ethane-propane stock gases.

Ethylene is scrubbed and purified, and piped in gaseous form direct to processing in the alcohol plant. On entering an absorber ethylene comes into contact with sulphuric acid of 90 percent concentration or higher. The resulting liquid is a mixture of monoethyl and diethyl sulphate. The esters leave the bottom of the absorber and are pumped into the bottom of a hydrolyzer column along with a measured volume of water. Here the esters formed in the absorber are converted to alcohol, ether, weak sulphuric acid, and small volumes of other materials.

Crude alcohol and other products pass

Crude alcohol transfer pumps in the crude alcohol unit at Baton Rouge



Close-up view of three of the towers in crude alcohol unit

to a stripping column. Steam carries off the alcohol, ether and a small volume of acidic material. The remainder of the water together with the dilute acid is withdrawn from the bottom of the tower. The acid goes to an acid cooler and then to storage where it remains until recovered and concentrated for reuse in absorbing the ethylene gas.

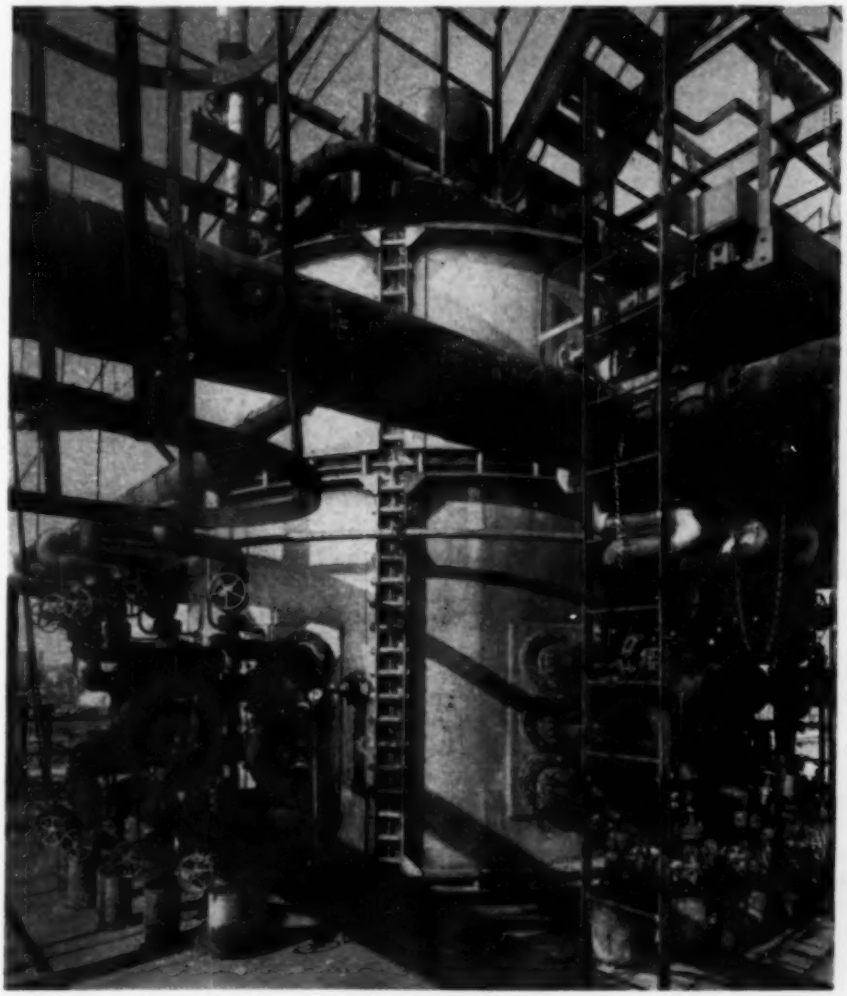
The vaporized mixture of alcohol, ether and water leaves the stripping column at the top and goes to a caustic scrubber, entering at the bottom. It passes up through the falling caustic soda solution. Spent caustic leaves the bottom of the scrubber while the vapors of alcohol and ether, together with steam and high boiling impurities, pass off at the top. The caustic neutralizes traces of acid carried over in the separation column by entrainment. The vapors are condensed and pumped to the crude alcohol storage tanks at the finishing building.

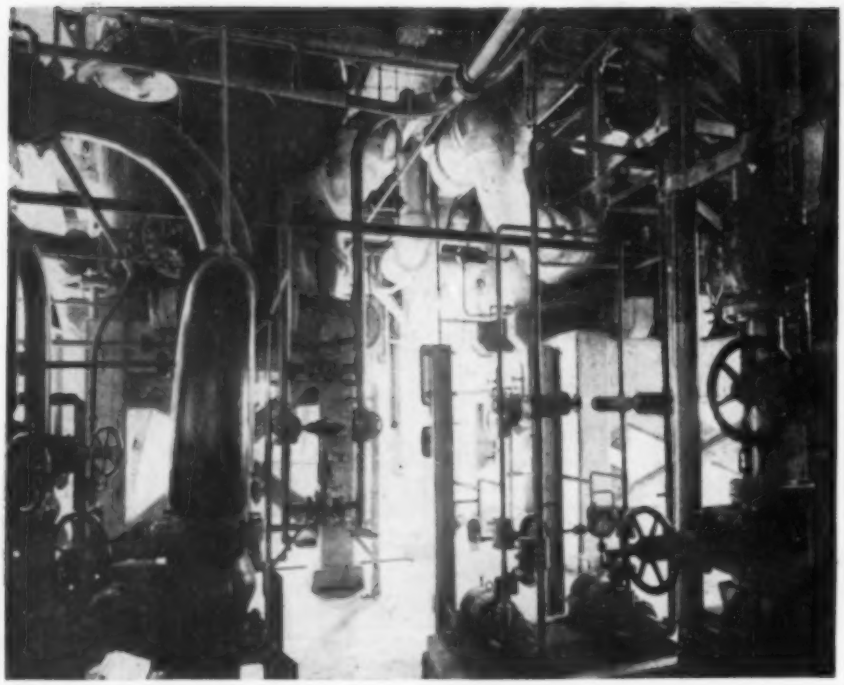
ETHER REMOVAL

At this point there is only a small amount of ether in the mixture which is mostly crude alcohol and water. The first step in finishing is to remove the ether. This is done in an ether column. Steam at the proper temperature enters the column vaporizing the ether and carrying it off at the top of the tower. The overhead from the column, a mixture of ether and alcohol, is water scrubbed. The alcohol is returned to the alcohol column and the ether is condensed and conveyed to storage for shipment.

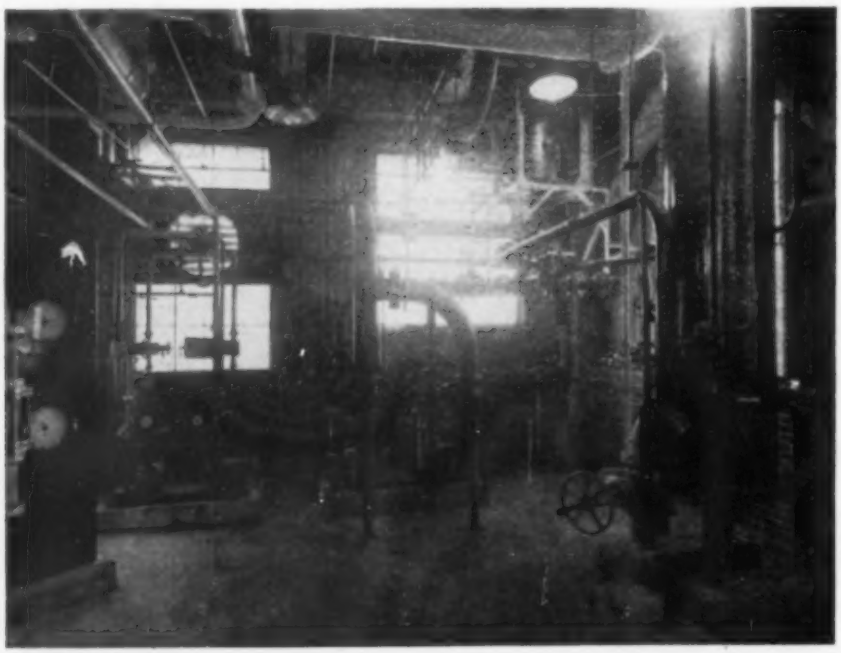
Crude alcohol bottoms are fed into an alcohol column, said to be the largest of its kind in the world, to remove the water.

Second stage concentrator in the sulphuric acid concentrating system. Heat is supplied indirectly through tubes of Hastelloy D inserted through the walls. The heating element used is Dowtherm A vapor at 20 lb. pressure





Pumps, transfer lines and base of the columns in the alcohol finishing unit



Transfer pumps and alcohol cooler in alcohol finishing unit

This very efficient, large fractionating column drives off overhead alcohol of 190-192 proof (95-96 percent). Water and high boiling impurities go to the sewer. The alcohol is then cooled and pumped to storage.

If, after testing, the alcohol in the unfinished tanks meets specifications, it is pumped to one of two weighing tanks in the receiving room as finished alcohol. The alcohol is then weighed and transferred to one of two weighing tanks in the denaturing plant. A weighed amount of denaturant is added, the contents of a tank weighed, mixed and transferred to alcohol storage tanks. The denatured alcohol is pumped to the loading rack for shipment in tank cars to consumers.

Let us return to the dilute sulphuric acid leaving the stripping column in the crude alcohol unit. This weak acid flows to an acid reboiler which is really a concentrating unit. Sufficient water is evaporated to raise the acidity to 70 percent. Water evaporated from the acid is returned as vapor to base of the generator in which it is used as a stripping medium. The acid is cooled and pumped to storage tanks.

The primary purpose of the reboiler is to concentrate spent acid. The reason for this particular set-up is to utilize the water evaporated and therefore save the cost of stripping steam consumed in the generator.

For further concentration of the acid a Simonson-Mantius two-stage vacuum acid system is used. Acid is pumped continuously from storage into the constant level feed tank. The acid rate to the concentrators is controlled by hand and is metered by a rotameter. The 70 percent acid enters the first stage evaporator operated at an absolute pressure of 2.5 in. of mercury. Here the acidity is raised to 89 percent. The acid then overflows into the second stage evaporator operating at an absolute pressure of 0.4 in. of mercury. The acid concentration is raised to the final desired strength. An advantage of this type of concentration unit is the lack of obnoxious fumes and odors.

The concentrators are vertical cylindrical vessels, with the heating tubes inserted through the walls. These tubes are arranged in banks, up to five or six tubes high. In both concentrators the heat is supplied indirectly through tubes of Hastelloy D. The heating medium used is Dowtherm A vapor at approximately 20 lb. pressure (575 deg. F.). Three Dowtherm vaporizers each with an hourly output of 30,000,000 B.t.u. were chosen. They are interesting as they represent the largest single installation of this type vaporizer.

HEATING MEDIUM

Five concentrators are supplied by these vaporizers. One is about 300 ft. from the vaporizers. Instead of employing gravity return of condensate the large volume of condensed Dowtherm A handled and the length of the return lines made it necessary to use pumps. Gas is employed in heating the Dowtherm. The burners are arranged so that there will be no local heating. No deterioration in the heating medium is noticeable after two years of operation.

The Simonson-Mantius unit is said to concentrate sulphuric acid without causing the customary objectionable fumes and odors.

Because of the low operating pressures maintained in the concentrators the acid temperatures are kept below 370 deg. F. If steam had been selected as the heating medium a pressure of 300 lb. would have had to be used.

Strong acid from the second stage concentrator overflows to the finished acid cooler where the temperature is lowered to 110 deg. F. It is then pumped by the submerged Lewis pump to the strong acid storage tanks and is ready for reuse in the absorber.

For a diagrammatic flowsheet and additional photographs the reader is referred to pp. 136-139.

R. S. McBRIDE *Editorial Consultant, Chemical & Metallurgical Engineering, Washington, D. C.*

Policy Battles Back of the Proposed RESEARCH FOUNDATION

As we have frequently predicted, Congress is almost certain to establish a foundation through which the Government may aid research in the fundamentals of science, public health, and national defense. Back of the current legislative proceedings are certain fundamental differences of opinion which are of importance to chemical engineers and to process-industry executives. This article spotlights these problems and undertakes in some cases to forecast the way in which the National Research Foundation may develop.—*Editors*

A National Research Foundation will be established soon by Congress. That conclusion seems fully justified by the general and enthusiastic support by a very large part of scientific and official Washington. The early opposition has been limited and critics are almost completely silent.

The form which the Foundation takes will determine largely the success and speed that may be expected in its establishment. Also the form and the authority granted will largely determine the relationship of this new Foundation to other government agencies, to the scientific and engineering professions, and to American industry. This article undertakes to emphasize briefly some of the more important policy controversies which underlie this rapid development.

The proposed Foundation as now envisaged will be guided by a board and administered by a director. Some quiet controversy, and still more confusion, have existed in Washington because of misunderstandings surrounding the dual function of the Foundation and the need for both a board and a director.

The board will be primarily an advisory agency, available at all times to assist the Foundation, the President and Congress in formulating policies for appropriation and administration in the fields of science and research.

But the Foundation has also the prospective duty of disbursing and administering large sums of money appropriated annually by Congress for aid in scientific education and for maintenance and expansion of research. The business of operating such an agency could not be well administered by a board. Clearly the head of the agency handling these business matters must be an individual who should have clear administrative responsibility to the President for conducting the affairs of the Foundation in conformity with the law and for the greatest public benefit.

Quite a controversy has arisen as to the way in which the board and director should be chosen. The end result, however, will almost certainly be a strong board of 12 or more members with an advisory function and a director who will actually manage and direct Foundation activities.

SELECTION OF OFFICIALS

Originally the scientific committees, under Dr. Vannevar Bush suggested that the President name the board membership without confirmation by the Senate. Some groups have even urged that the President be required to name the board members from a panel nominated to him by the National Academy of Sciences. Those two suggestions are not realistic as they relate to Washington methods. There is no likelihood that Congress will want so important an agency set up without having Senate approval of the board membership. On the contrary it is likely that the director and even the senior assistant director will require Senate approval.

Many persons think also that the President should seek suggestions regarding choice of board members other than from the Academy. He doubtless will do so. To be sure on this point, one need only recall the way in which the original Natoinal Defense Research Committee was named by the late President Roosevelt. By some quiet planning the desired personnel were selected. Then the Academy was asked to nominate those particular persons to constitute NDRC. If by any chance Congress does accept the idea that the Academy should be asked to make nominations, it is still expected that there will be many influences which should assist in the selection of a competent board membership.

It is not so clear whether Congress is going to decide that the director and the senior staff of the Foundation should be named by the President or whether these top officials should be named by the board. A combination may be worked out. For example, it is not unlikely that the President will name, and the Senate confirm, the director and the senior assistant director, taking such action on the basis of recommendations from the board. Certainly the President would depend on the board for suggestions as to these top administrative officials. At the same time a competent board would attempt to recommend individuals who were acceptable to the President.

A fundamental issue developed early in the program because of differences in the original Bush and Kilgore proposals as to the relationship of the Foundation to present scientific bureaus of the government. The Bush proposal contemplated a board made up by the President without specific provision that other government officials serve on the board. The Kilgore proposal went to the other extreme, to require that eight of a board of seventeen should be cabinet members, representing the departments of War, Navy, Commerce, Labor and others.

RELATION TO OTHER AGENCIES

It is not yet clear, as this article is written, how Congress will finally decide these matters. But it does seem that some middle course may well be taken. A good many scientists are already persuaded that this Foundation organization should not ignore present career agencies of the government. It is generally considered quite proper, for example, that four or five directors of government research might

well sit either as full members or as non-voting members of the Foundation board.

Among officials most frequently mentioned in that connection are the director or chairman of National Advisory Committee for Aeronautics, director of National Bureau of Standards, administrator of Agricultural Research Administration, surgeon general of Public Health Service, and the director of research of one of the military departments. Certainly the smooth and successful functioning of the board can only be achieved if men of this type sit in on top policy discussions, with or without a vote. It is to be expected, therefore, that some sort of representation of these groups will be worked out either by Congress in writing the law or by the President when he selects the board membership.

POLITICAL MEMBERS

It is not so clear whether Congress will wish to have some members of political rather than scientific leanings, as would be the case if the secretaries of departments were named. Still less evident is the disposition of Congress and the President regarding the selection of unofficial members. Some scientists think that every member of the board and every administrative officer of the Foundation should be an outstanding scientist experienced in direction of research. Other influential groups feel that the layman's point of view and the industrial point of view should also be represented on the Board. And there is very general emphasis on the fact that the director and top staff of the Foundation must be good administrators, whether they are great scientists or not.

It is evident that the means by which the end result is reached is not important. But it is essential that the final selections of top personnel be made in some fashion that will provide thoroughly competent persons to carry on this work. The success of the Foundation in serving the public will depend quite as much on continued prestige as upon the scientific competence of those who head the Foundatoin. As always with such matters, public acceptance and especially the continued approval of Congress, are necessary for its success.

FUNCTIONS OF FOUNDATION

All parties agree that the job of the Foundation will be to promote science and research for benefit of the nation. Naturally, matters of national defense and public health are most often cited as the reasons for such agency. But official Washington has discovered that there is such a thing as fundamental science, which often looks of little value but very frequently has immense importance. Perhaps nothing less than the atomic bomb project could have demonstrated this fact.

Under existing circumstances one might well say that the Foundation will have three major functions: It will seek new fundamental scientific results; it will contribute scientific aid for the public health; and it will create means for more effective national defense. All the rest of the functions are subordinate to one or more of these three functions.

The Foundation will also have the responsibility of advising the President and Congress at suitable intervals what changes are desirable in government research, even that with which the Foundation is not directly concerned. This means that all of the older science agencies might even become subservient to the Foundation.

Apparently most of those who have studied this phase of the program hope that such subservience will not come about. Experienced research men know that good work and most valuable results do not come by a mechanized or bureaucratic system. They know that independent thinking and aggressiveness of institutional planning are vital necessities if one expects to get the most from research spending. They know that there is rarely waste in having duplicate effort made on research projects. Two seemingly parallel investigations usually supplement rather than duplicate each other.

A successful research foundation may produce many patentable ideas and results which, of course, become of value to the public only when they are used. One of the basic questions still not settled by Congress is one of patent policy for the new foundation.

PATENTABLE RESULTS

Opinion seems to be growing rapidly in Washington that when the government sponsors research that results in a patent, it should become government property. Up to now there has not been general acceptance of that idea but it seems likely to be crystallized as a matter of law. But government ownership of a patent is only one step toward control. At present there is no government agency that has any authority to license patents owned by Uncle Sam. It seems quite possible that during the establishment of this Foundation, a provision might be drafted for taking over old and new patents which the government owns in order to arrange for their proper administration.

Much of the Foundation spending on research will mean only partial or indirect government support. There remains, therefore, the question as to ownership of patents resulting from such work only partly supported, or perhaps only remotely aided by government money. Where there is significant partial support, it is expected that the government will get shop rights. Some people think that the government should get more, even complete control or ownership.

It seems likely that this very difficult question may cause the most bitter differences of opinion, both in Congress now and later during operation of the Foundation. The difficulty would be less if the Foundation spending were to be in its own laboratories. But that is not planned. In fact, it seems quite certain that the Foundation will operate no laboratories of its own. It will be simply an agency for allocation of funds granted by Congress, just as OSRD has been during the war period.

It is hoped by those of long vision that the Foundation may be granted the right to set up rules for the taking and licensing of patents and for the proper application of results of investigations which it has supported in whole or in part. If that is wisely done we may expect that one of the parts of the operating Foundation will be a patent holding and patent administration unit. And it is to be hoped that such unit may function fairly and equitably in accordance with the facts as they are found in each individual case. Certainly some plan must be found to prevent interference with industrialization of the results and the handicap of teaching and consultation work on the part of the science staffs of the institutions where Foundation funds are expended.

NOW, LATER, OR NEVER

A number of industrial groups have been disturbed by the tremendous sweep of the proposed Foundation program. They have feared that hasty legislation might create an agency which would actually interfere with industrial investigations.

Quietly, those of this belief have suggested a postponement of legislation. It appears that their wishes will not be met by Congress. The legislators have been tremendously stirred by the success of atomic-energy investigations. Some of them seem to think that scientists can pull another such potent rabbit out of the hat of research any time that they are given big money to spend. That, unfortunately, is a misconception widely held.

Perhaps the only thing which those who are apprehensive can do now is to ask legislators to recognize their inability to complete a national research program all at once. It is probably not feasible to secure postponement of the legislation. But it is to be hoped that these more conservative voices will be heard sympathetically at the Capitol.

Certainly it must be understood that whatever foundation is now established, and whatever program is first authorized, unquestionably there will be need of revisions as time goes on. If Congress sets up a foundation in a flexible form, and is content to fix only the general framework, then there will be little difficulty in making adjustments and even some radical changes as the need for these develops during the next few years.

SCIENCE vs. POLITICS

Challenge to Chemical Industry and Profession

H. C. Parmelee

S. D. Kirkpatrick

A. E. Marshall

The Chemical Industry Medal for 1945 was awarded to S. D. Kirkpatrick by the American Section of the Society of Chemical Industry in New York on November 9. H. C. Parmelee and A. E. Marshall served as his personal and professional sponsors. The following excerpts from the address of the medallist emphasize an important opportunity now before us — to help in shaping national policies so that the results of research will contribute most to the public good

For the first time in the memory of most of us, science has become a major political issue in this country. A half dozen different legislative proposals are pending in Congress. President Truman devoted an important section of a recent congressional message to the need for supporting scientific research and development. Editors of the daily press have been plumping for a "national science policy." Even the man in the street now knows that his future depends upon "science," but he does not quite understand how. The immediate reason for this renaissance of interest in research is not alone the atomic bomb, but the whole wide range of wartime developments that have come from the laboratories and plants of American industry.

These same atomic bombs that had such decisive effect in speeding the Japanese capitulation have also brought up for decision a problem that has long been worrying the lawmakers and politicians, namely, how to provide national recognition and federal support for science and research. Some of the leaders in Congress have been tremendously impressed with what has been accomplished under war stimulus in a great coordinated undertaking where there was literally no limit on funds and facilities. Projecting this program into the future, they see vast possibilities for social and economic gains, provided that the research is "properly guided" and the resulting inventions "controlled in the public interest." Those last words are set off in quotation marks for they have a familiar ring to those of us who have been following the current hearings and congressional debates on pending legislation. They mark, in a sense, the crossroads where the paths of science and politics begin to separate.

Scientists, in general, are suspicious of the politicians. They are inclined to distrust their motives. They see regimentation and political domination in almost any proposal for coordination and control. They see veiled efforts for reforming the patent system and other social objectives hidden in seemingly innocuous provisions in the pending legislation. They have little patience with the political machinations and log-rolling that seem an inescapable part of the law-making process.

Gradually, however, these differences in viewpoint and temperament are in process of change, and who is to say that the change may not be for the benefit of both? We agree among ourselves that politicians need a great appreciation and understanding of science. But will we agree to the converse, namely, that scientists and engineers need a better appreciation and working knowledge of the ways of politicians? Perhaps we have been remiss in having failed to recognize and cultivate these phases of the science of human relations.

A few years ago we were complaining about the fact that as scientists and engineers we were seldom consulted on problems of public interest, that commissions of lawyers and economists were appointed to deal with essentially technical problems involved in transportation, communication, public health—even to those of the local draft boards. Because the scientists were relegated to advisory roles in the War and Navy Department, the dominance of the military viewpoint permitted Selective Service to handicap our national progress by drafting so many of the most promising young scientists from our plants and laboratories and at the same time drying up new sources of supply from our engineering schools and colleges. These are some of the things we have been charging against the politicians during these war years. Is it possible that the blame is at least partly our own? Have we always used our influences in the right places and with the right people? Or have we been content to talk among ourselves about the logic of our position?

Even now there is no convincing evidence that all these mistakes are going to be corrected, although there are indications that a gradual change is in process. As would be expected at the end of a war in which science has played such a stellar role, there is a tremendous nationwide appreciation of the importance of research. Science and engineering are not only at their all-time peak of performance, but enjoy their greatest public acceptance. Recognizing this situation, it is our golden opportunity to help in defining a national science policy to encourage and provide incentives for basic research, to stimulate and support the education and training of scientific manpower and to help in every proper way to see that the results of research are applied to advance the public good—all this to be accomplished without dictation or regimentation.

Science and State are not necessarily incompatible but they will best live together where there is knowledge and understanding as well as freedom of inquiry. Likewise Science and Politics, which have so much to learn from each other, may yet find the basis for a beautiful friendship from which can flow much of lasting good for our own country and for mankind.

EARL W. FLOSDORF *Director of Research and Development, F. J. Stokes, Machine Co., Philadelphia, Pa.*

High Vacuum Measurement With the McLEOD GAGE

Oldest of the methods for accurate measurement of high vacuum, the McLeod gage is still the fundamental instrument from which other types must be calibrated. Furthermore, it is still used extensively for routine measurements in both the laboratory and industry. Now that high vacuum is becoming an important tool in many chemical engineering industries it is particularly important that the gage and its use be understood.—*Editors*

In spite of the fact that it was in 1874[1] that the McLeod gage first appeared, it still remains the basic type of instrument used for measurement of high vacuum. Since that time, although various modifications and improvements have been proposed[2,3,4], they all utilize the same basic principle described by McLeod. This method provides the only satisfactory known means for absolute measurement of the extremely fine pressures of high vacuum. Technically, the high vacuum range is usually regarded among engineers as applying to pressures below 5 or 10 mm. Hg and runs on down to the zone of microns and fractions thereof. A micron is 0.001 mm. Hg and provides a convenient term for expression of low pressures.

A closed-end manometer or a U-tube type of mercury manometer of sufficient length may be used for measurement of absolute pressure, but such a device is limited in sensitivity by the difference in level of mercury which can be read. Lenses or other means of magnification of reading are not suitable since there is insufficient movement of the mercury with slight difference in pressure. Inertia of movement under slight pressure differences, along with frictional resistance, nullifies use of lever and float arrangements for increasing sensitivity. For direct measurement in terms of absolute pressure of mercury, therefore, only the McLeod type of vacuum gage is suitable.

All other gages for measurement of high vacuum are based on some other property in the vacuum system and accordingly all other gages must be calibrated against the McLeod type. For example, one type of electrical gage is based on the thermal conductivity of the residual gases in the vacuum system. A source of heat, such as a hot wire element, is used and either a thermocouple or resistance thermometer wire is used to measure the amount of heat transmitted to it. Still another type of thermal gage operates on the temperature of the hot wire or filament itself, the temperature of this wire being determined by the rate at which heat is carried away from it. The temperature of this wire is determined by change in resistance. The Pirani gage is of this type. Hydrogen and even water vapor conduct heat to a greater extent than air at the same pressure and consequently a gage calibrated for air would give inaccurate readings with other gases and vapors. With hydrogen, the error would be a high reading in terms of air calibration.

Further, with this type of gage, the surface characteristics of the heating wire become altered with age so that recalibration against the McLeod gage is necessary frequently, even with air measurement alone. This gage is sensitive only in the range of 1 to 100 microns. At higher vacuum, thermal conductance is too small to enable the method to be used and at higher pressures the change in conductance is too small to confer proper sensitivity.

IONIZATION GAGES

An ionization type of gage is also used, but does not operate at pressures above about 0.5 micron. In fact, if the ionization tube is not turned off at pressures above this, it will be damaged permanently so that there is serious limitation in use.* (For a short period, pressures up to 200 microns will cause no damage.) Briefly, the principle of the ionization gage makes use of the fact that an electron emission current from the hot cathode of the three electrode vacuum tube will cause ionization of gas molecules in the tube by bombardment. These ions flow to a plate maintained at a sufficiently high negative potential with respect to the hot cathode. Then, by means of a meter in the plate circuit, the ion current is measured to indicate directly the vacuum in microns.

Other types of gage have been designed, such as those depending upon a calibrated leak through a fine capillary; or a differential bellows by means of which a comparison is obtained against a known reference vacuum; or still another type in which a U-tube carrying a fluid of specific gravity much less than mercury is used. Above this fluid in one arm a known reference vacuum is maintained so that, by difference in level, the exact vacuum in the system may be determined. With all these gages, a McLeod gage must be used either to check the "reference vacuum" or to calibrate the scale.

In spite of the limitations of the gages described, there frequently are special applications where gages of these kinds are well adapted. Unless some special reason exists, however, the McLeod type is always to be preferred since it is the ultimate reference standard. The McLeod gage does not require batteries or other electrical connections for operation and it is rugged; hence, it is used directly for all ordinary vacuum measurements. Also, the McLeod type may be used over a much wider range of vacuum; say from a fraction of a micron up to 5,000 microns. With other gages a series must be used for such a range, each covering a small portion of the total range. Further, in the swivel type of McLeod gage, one has available all of the above-mentioned advantages of the McLeod type, in combination with portability.

With the McLeod gage, non-condensable gases other than air, such as hydrogen, cause no error in reading but condensable vapors such as water or alcohols cause serious error unless the gage is properly designed and used. Since the McLeod gage is the ultimate standard of measure-

* A new type of ionization gage that does not suffer from this disadvantage and also can operate at pressures to 10 mm. has recently been announced (*Chem. & Met.*, p. 131, October 1945).—Editor.

ment of high vacuum and because of its convenience and accuracy, it is the instrument of choice. It becomes appropriate therefore, to consider its proper design and use under all conditions.

The portable swivel type[3,4] (Fig. 1) has offered one of the most convenient forms and is widely used. Others forms of McLeod gage are bulky and cumbersome and also require large quantities of mercury. Many of them are fragile and may require an auxiliary vacuum for operation. For this reason, in the following discussion, the McLeod gage will be discussed in terms of the swivel type, although the basic principles apply equally well to all forms of McLeod gage.

PRINCIPLE OF OPERATION

Turning the swivel gage diagrammed in Figs. 2 and 3 from the position of Fig. 2 to that of Fig. 3 cuts off a definite volume V of the rarified air at the unknown pressure P of the vacuum system, and compresses it to smaller volume v at a higher pressure, *p*. It will be observed that V is the combined volume of the measuring bulb B and the center tube C (closed end or measuring capillary). The value of *p* is equal to the difference in level of the mercury in the center tube C and the right outside tube compensating capillary). Boyle's law is used in calibration of the scale.

During compression the pressure to volume relation of Boyle applies only to noncondensable gases. With condensable vapors like that of water, there is much greater contraction since they withstand only a small degree of compression before condensing. If the pressure *p* exerted on the vapor trapped in the center tube exceeds the condensation pressure (which varies with temperature), the vapor condenses. As a result of the greater contraction in volume in the center tube from this cause, the mercury will rise farther than otherwise to indicate a far better vacuum than actually exists. There is no simple correction or multiplication factor that can take account of this.

WATER VAPOR EFFECT

1. Condensation; Higher Pressure Range—Compare two gages, as in Fig. 3*a* and *b*, one having a range of 0 to 5,000 microns and the other 0 to 700 microns (the gages having about the same scale length), connected to the same vacuum system. With water present, different readings will be obtained but neither one will be correct. This is because it is the difference in level *p* of the mercury in the two capillaries which sets up the pressure resulting in condensation of the moisture. At a temperature of 24 deg. C. the vapor pressure of water is 22 mm. In other words, if the difference in level *p* of the mercury in the two capillaries is 22 mm. or more, the vapor will be condensed. This point on the measuring capillary, corresponding to the difference in level which is equal to the vapor pressure, we may call the condensation point.

In the wide range gage, reading from 0 to 5,000 microns, the condensation point corresponds on the scale to a pressure of about 100 microns; on the narrow range gage, to 11 microns as indicated in the drawings. Consequently, if there is largely water vapor in the gage, at say a pressure of 250 microns, and very little air, say 2 microns, the vapor will condense to liquid (invisibly small in amount) and the contraction in volume will cause the mercury to rise in the measuring capillary to within 22 mm. of the top—which corresponds to the vapor pressure of the condensed water.

Comparison of the two gages will thus result in the wide range instrument indicating 100 microns and the narrow range one, 11 microns. In this example, where the total pressure of air and water vapor combined is 252 microns, it is seen that the total pressure is far above 11 microns and even above 100 microns. All the operator knows, however, is that the pressure of the air alone is not over 11 microns, because if it were more, it would prevent the mercury from rising so high.

When there is enough air in the system to yield readings above 100 microns, the two gages would come into closer, but still not exact, agreement and both readings would still be in error. For example, take a case at 24 deg. C. where there is 100 microns pressure of air and 1,500 microns pressure of water vapor, yielding a total of pressure of 1,600 microns. With the wider range scale, *p* would comprise 22 mm. of length for the compressed air plus another 22 mm. for the partial

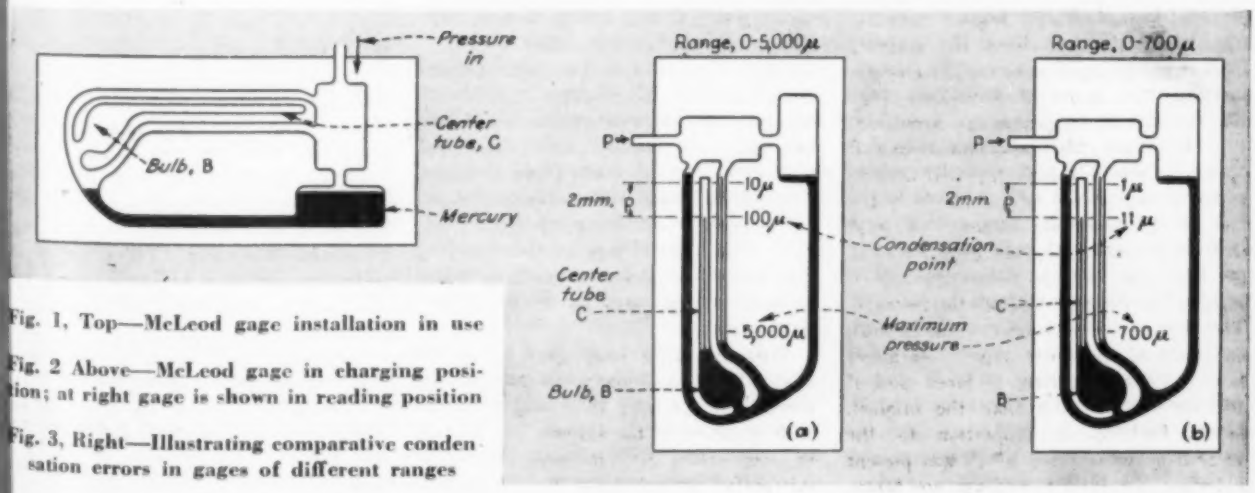


Fig. 1, Top—McLeod gage installation in use

Fig. 2 Above—McLeod gage in charging position; at right gage is shown in reading position

Fig. 3, Right—Illustrating comparative condensation errors in gages of different ranges

pressure of water vapor under compression which sets up saturated conditions. Thus 44 mm. of scale length would indicate a pressure of 450 microns. Similarly, with the narrower range scale (0 to 700 microns), p would comprise 51 mm. for the air and 22 mm. more for water vapor, a total length of 73 mm. indicating 200 microns. Both gages would give exactly these same fictitious readings in microns with actual pressures even as high as 5,000 microns, if only 100 microns of this total pressure were due to air and the remaining 4,900 to water vapor. Similarly, with 100 microns of air and 150 microns of vapor, a total of 250, the wide range gage would read about 175 microns and the narrow range instrument 200 microns. Drying the gages will correct these errors.

2. *Outgassing; Low Pressure Range*—At total pressures below the condensation point, condensation cannot occur and accurate readings are obtainable. Water vapor coming slowly from the glass or mercury in the gage, however, may not be pumped away completely enough to establish equilibrium with the system, in which case a fictitiously high reading is obtained. Generally, this is at pressures below 10 microns, but by drying this error also may be corrected. Outgassing of noncondensables from glass or rubber can be corrected only by pumping sufficiently long. Further, at very high vacuum, rubber connections must be eliminated.

CONDENSATION CORRECTION

1. *Hot Gage Method*—This is applicable where the range of operating pressures is such that, at some reasonably high temperature, the condensation point will exceed all pressures to be encountered. For example, at 38 deg. C., the 5,000 micron range gage will give true total pressures up to 500 microns; and at 48 deg. C., up to 2,000 microns (the 700 micron range gage being correct up to 250 microns). At 66 deg. C. either gage would give true total pressures up to the maximum of its range. This method will not always function at the highest vacuum, e.g., where moisture from the mercury itself is not pumped away rapidly enough; indeed, then errors of fictitiously high readings due to outgassing are magnified.

2. *Air Flush Method*—This means is applicable where a high capacity vacuum pump is used. A tee tube is placed in the line to the gage. By means of a stopcock or a pinch-cock, the gage is closed off from the vacuum system and air is admitted to the gage through the tee tube. The gage is then evacuated again to flush out most of the water vapor. In about two minutes a reading is taken and it will be found higher than the original, before flushing, in proportion to the amount of water vapor which was present initially. As further readings are taken, however, it will be noted that they gradually become lower again as vapor diffuses back into the gage. Whenever a reading close to the true total pressure in the system is desired, the gage must be flushed. This is not applicable at higher vacuum.

OUTGASSING CORRECTION

1. *Chemical Trap*—This is the simplest method of all. A glass tube large enough in diameter to cause no undue restriction of flow is used. It is filled with a chemical selected on the basis of a vapor pressure well below the minimum pressure to be encountered in the high vacuum system. By suitable selection, chemicals for vapors other than that of water which cause similar errors, such as alcohol and oil, may be removed. An indicator chemical may be used so that time for replacement may be determined readily. At highest vacuum, say at pressures below 0.1 micron, it may be necessary to cool the chemical trap.

2. *Freezing Trap*—A low temperature condenser kept cold by means of dry ice, liquid air, or liquid nitrogen may be used for freezing out the moisture at a properly low vapor pressure. The necessity of continual supply of the refrigerant and of frequent removal of condensate makes this method less convenient.

The chemical or freezing trap causes true total pressures to be indicated even though there is only dry air in the gage at all times. This air is present in quantity so that its pressure exactly balances the total pressure of water vapor and air in the system on the other side of the trap. Even traces of moisture will cause some degree of error and new gages (or old ones that have just been cleaned) may require several days under vacuum, protected by a moisture trap, for complete removal of moisture in order to insure accurate readings. Always keep the gage protected and admit only dry air to it.

Since the wider the range of the gage the higher the condensation point, a moist gage of wide range can be used up to higher pressures than one of narrow range before errors of condensation arise. A condensable vapor trap is recommended to exclude permanently all vapors, the chemical type being the most practicable. Using two gages of different scale range and obtaining identical readings is the best means of knowing with certainty that accurate readings are being secured.

With a McLeod gage of the recording type for producing a continuous record of vacuum, a proper trap for moisture is indispensable.

With the wider range gage mentioned above (having a condensation point at 100 microns on the scale at 24 deg. C.), and with moisture in the system, any reading of more than 100 microns should be interpreted as indicating an air pressure about equal to the actual reading, or a little less, plus an unknown amount of water vapor (since the water vapor would be condensed in the capillary to just a fraction of its ordinary volume).

Readings near 100 microns (say, ±25 microns or less) should be interpreted as indicating an air pressure of not more than the reading, plus an unknown amount of water vapor. In this case, the actual air pressure might be only a few microns and the rest of the pressure would then be caused by water vapor. However, the actual amount of water vapor might be very much more than the reading on the gage, since most of the vapor might have condensed to a smaller volume.

WHEN GAGE IS WET

Readings below the 100 micron point but above 10 microns can be interpreted as indicating close to the true total (air and water vapor) pressure in the system.

The same interpretation applies to narrower range gages (such as one reading from zero to 700 microns), but in this case also the interpretation would be based on whether the reading is above or below the condensation point (11 microns instead of 100 microns). The wider the range of the gage (say, one of zero to 5,000 microns as compared to one of zero to 100 microns) the greater the proportion of water vapor which is permissible before error by condensation results.

In certain industrial operations, it may not be necessary to exclude moisture from the gage. For example, in a vacuum drying system where water vapor is present, the process may require only that the air pressure be kept below a certain point such as 400 microns. The presence of water vapor would not seriously or significantly interfere with readings that are required only to yield this sort of an indication. There would be no advantage in using a moisture trap to exclude the moisture. The readings would not, however, be more than indications of this one condition and would not be absolute.

In summary, the McLeod type of gage after 70 years still remains the only instrument for measuring absolute pressure in high vacuum reliably and directly without reference to other gages for calibration. When the McLeod gage is used properly, gases like hydrogen and condensable vapors like water mixed with residual air do not affect the accuracy of readings. Several methods may be used for taking care of condensable vapors. Proper use of the gage requires a condensable vapor trap that will permanently exclude all vapors.

REFERENCES

1. McLeod, *Phil. Mag.*, **47**, 110 (1874).
2. Kaye, G. W. C., "High Vacua," p. 12, Longmans, Green & Co., New York, 1927.
3. Flosdorf, Earl W., "A Simplified and Portable McLeod Gage," *Industrial and Engineering Chemistry (Anal. Ed.)*, **10** 534 (1938).
4. Flosdorf, Earl W., U. S. Patent No. 2,278,195.

Recognize Veterans For What They're Worth

ERNEST W. FAIR
Bristow, Oklahoma*

Some of our returning servicemen are beginning to grow alarmed over the words that are being used to describe their reappearance in the job market. They hear themselves constantly referred to as a "problem," with little thought given to the "opportunity" of employing veterans. Much is said of "taking care" of ex-servicemen and little of "taking advantage" of them. Here a soldier-author tells something of what the serviceman has to offer the chemical industry, and there is the strong implication that we do both him and ourselves a real disservice in clinging to the theory that work must be "made" for him. His new slant has possibilities.—*Editors*

POPULAR misconception notwithstanding, the average discharged serviceman does not come back to look for a job with the attitude that the world owes him a living; he does not want something for nothing; he does not feel that industry is obligated to find a job for him. What he wants is an opportunity to do some fast catching up in his civilian career, and toward that end he intends to bear down hard on his new job.

The idea that industry owes the veteran something did not originate with the veteran. In fact such notions are not popular with the rank and file serviceman, for they insinuate that he is not qualified to proceed on his merits. That implication does him undeserved injury, for, by dint of intensive military training, most of which has a close counterpart in industry, he has a firm, legitimate basis for claiming a job. It is unfair to transfer his claim to the limp basis of charity. It is time to emphasize what he can do instead of what is due him.

If industry wants to think that it owes the serviceman something, let it discharge its obligation by taking the trouble to become familiar with the special skills he has acquired in service. In a moment we will try to make that kind of analysis for the chemical industry; it is our hope that employers will recognize the serviceman's opposite number in industry and, that done, will begin to conceive of the veteran, not as a drug on the market, but as a valuable commodity.

Fortunately for the employer there is a handy key by which he can pick the veteran he wants. Each man was assigned early in his army career to a particular field of work, his so-called Military Occupational Specialty. By the title and number of a veteran's MOS an employer can tell the kind of work for which the man is suited.

BY THEIR M.O.S. . .

Following are the MOS classifications of special interest to the chemical industry:

Chemical Engineer (293)—Performed specialized work in chemical engineering as applied to chemical warfare and the use of toxic gases. Designed chemical equipment. Set up and arranged chemical laboratories. Supervised organic and inorganic chemical processes. Performed research in toxic and non-toxic gases, explosives, and chemicals. Designed and devised equipment for protection against and neutralization of chemical agents. Prepared reports on enemy material for use of intelligence agencies. Used chemicals and laboratory equipment of all kinds.

Chemical Laboratory Assistant (411)—Assisted in military chemical laboratory working with toxic and non-toxic gases and explosives. Performed various routine tests, such as filtration, titration, and precipitation. Made laboratory test reports on toxic and non-toxic chemicals and explosives. Furnished test data. Checked analyses with specifications. Maintained supply of chemicals in laboratory. Used all types of laboratory equipment.

Chemical NCO (870)—Trained others in defense against chemical attack. Discussed the various toxic and non-toxic gases used in warfare. Described their characteristics and familiarized the men with their respective odors and means of identification. Demonstrated their use.

Chemist (292)—Conducted investigations and research in the various branches of chemistry dealing primarily with toxic or non toxic gases and explosives. Made inspections of chemical warfare materials to determine their serviceability. Supervised destruction of unserviceable material. Examined enemy chemical material. Used chemicals and most types of laboratory equipment.

. . . YOU SHALL KNOW THEM

Following are some of the more general MOS classifications, of interest to the chemical industry as well as any other:

Administrative NCO (502)—Supervised and directed work of one or more administrative sections of a headquarters organization in the preparation of correspondence, records, forms, reports, and the like. Supervised preparation of such items and generally had a wide range of office experience.

Electric Motor Repairman (304)—Installed, tested and repaired electric motors and accessory equipment and has familiarity with motor operation, electrical theory, and the use of most hand tools. In some instances received a course in electrical repair work in an army school.

Auditor (390)—Audited fiscal or property records, examined inventories and property vouchers. Generally had a college degree with major specialization in accounting or business administration or a great deal of civilian experience before coming into the service.

Labor Foreman (356)—Supervised a group or groups in the performance of unskilled jobs. Has some knowledge of supply and warehousing problems.

Shop Clerk (457)—Performed various clerical and technical duties in connection with the operations of military shops. Kept records and generally had similar civilian experience before entering the service.

Stenographer (213)—Took dictation in shorthand of correspondence, board proceedings, hearings, and reports. Generally an accomplished typist. Did filing, indexing and record keeping and operated various office machines.

Supply Clerk (835)—Performed various clerical and stockhandling duties in connection with receipt, storage, issue and shipping of general supplies and equipment. Maintained stock records pertaining to such items as amount, kind, and value of supplies and equipment received, issued, expended and on hand. Sometimes has completed a course in supply activity at an army school.

Clerk-Typist (405)—Performed numerous clerical and typing duties in headquarters units. Used most office machines and equipment.

Familiarity with these army designations will accomplish two things. It will aid the employer in correctly selecting and placing the veterans he hires. And it will help the veteran get out from behind the smokescreen of charitable thinking to a point where he can be recognized for his talents.

* Sgt. Fair's manuscript was written in France, September 1945.

D. GORDON *Director of Engineering, Foster D. Snell, Inc., Brooklyn, N. Y.*

UNIQUE PLANT

Produces Tung and Peanut Oils

It is doubtful whether a plant such as the one described here has ever before been built, for it embodies a combination of features seldom if ever required of an oil processing plant. Not only must it process either tung nuts or peanuts from their raw condition through cleaning, pressing, and refining, but it must operate in a part of the world where electricity, steam, and even tin cans must be made on the scene of operations.—*Editors*

Uncommon requirements for this plant, engineered for the Continental Commodities Corp. of New York, demanded a combination of equipment at minimum expenditure to be suitable for processing either peanuts or tung nuts. Furthermore, its isolated location on a high plateau in the interior of the island of Madagascar necessitated the design of complete facilities for generating electric power, process and heating steam, and machinery for making cans from tin plate.

Peanuts are converted into a high grade edible oil and a press cake meal which, because of its protein content, is valuable as a stock feed. The tung nuts are converted into a clear drying oil and a press cake meal which, because of its laxative nature, is not suitable for stock feed but is used as a fertilizer material.

Processing of peanuts into oil may be divided into three over-all operations—cleaning and preparation, pressing, and refining. In the cleaning and preparation operation the raw nuts are cleaned of earth and refuse, the cleaned nuts are decorticated, i.e., the shells are broken and removed from the kernels, and the kernels are ground into meat. In the pressing operation the ground meat is dried in a steam heated dryer, pressed in a continuous rotary expeller, and the cake separated from the crude oil. In the refining operation the crude oil is neutralized, bleached, and deodorized under heat and vacuum to produce a high quality edible oil.

The processing of tung nuts into oil may be divided into two over-all operations—cleaning and preparation, and pressing. The tung oil is not subjected to the refining steps required for edible peanut oil.

The cleaning and preparation and the pressing, or expelling, operations are practically continuous. The refining operation is of the batch type.

Raw unshelled peanuts are carried by troughed belt conveyor from outside storage into the building and deposited on an oscillating screen type shaker-cleaner which separates earth and refuse from the nuts. The nuts from the tops of the screens are fed by conveyor and elevator into a disk huller containing rotating plates that decorticate or break up the shells of the nuts. A non-electric magnet of the alloy permanent type installed in the feed spout of the huller removes tramp metal that might injure the rotating plates. The mixture of shells and kernels discharge onto the top tray of an oscillating screen type separator-purifier, from the end of which the shells are lifted by an air fan into a cyclone collector. The air velocity is adjusted so that it is just enough to lift the shells but not the kernels.

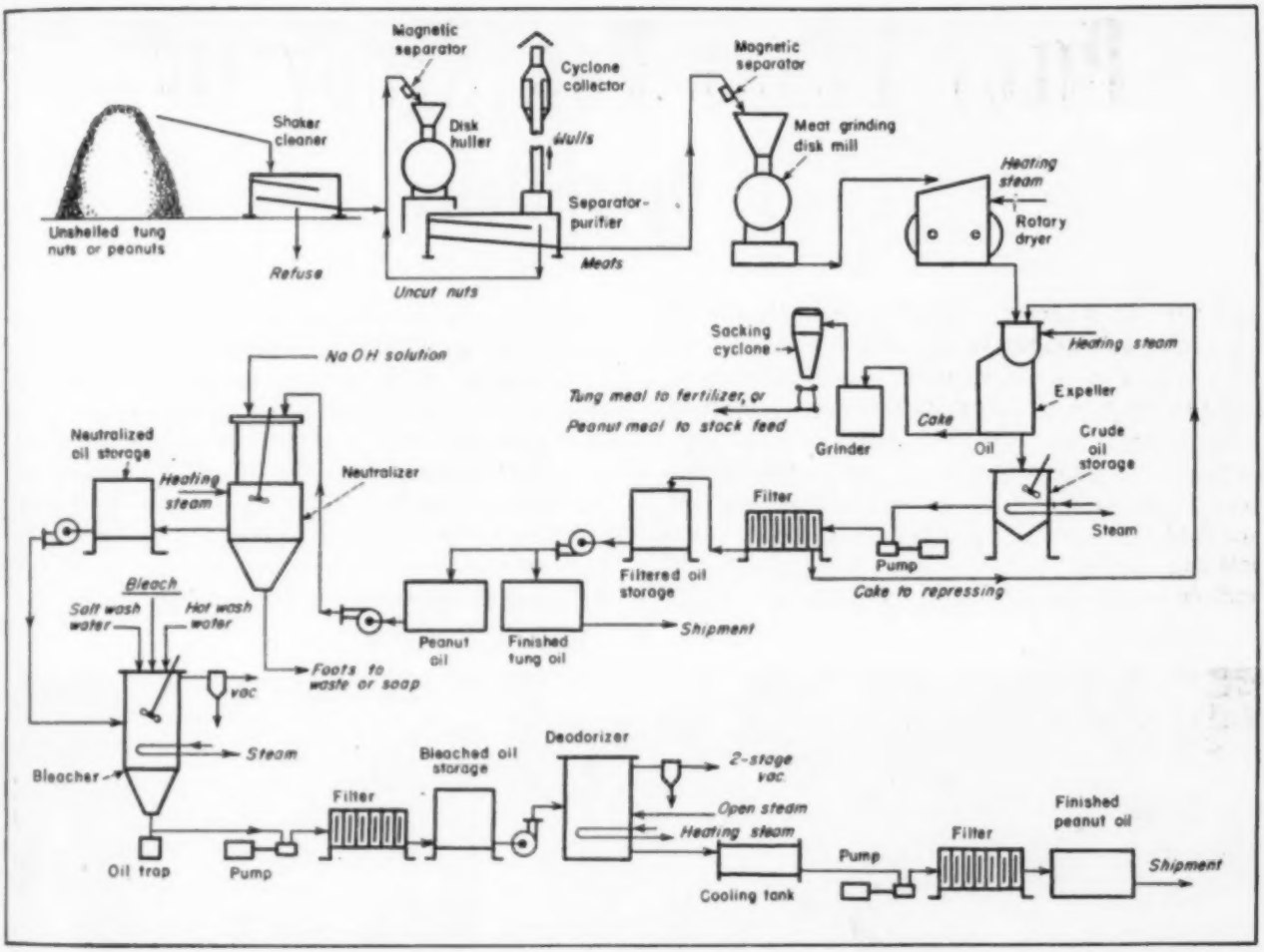
Kernels are ground by a disk mill into meat which is led to a steam heated continuous rotary dryer where the water content is reduced to 2 to 4 percent by weight; this gives better results in the pressing operation. The dried meats are pressed in an expeller with continuous flow and separation of oil and cake. The cake, discharged from one end of the expeller, is carried away by an inclined screw conveyor into a cake grinder and after fine grinding, is blown into a cyclone collector and packed into bags. The peanut oil, discharged from the opposite end of the expeller, is filtered and delivered to an intermediate storage tank.

Crude peanut oil must be refined before it is satisfactory for use as a high grade edible product. This is done by neutralizing, bleaching, and deodorizing. A charge of crude peanut oil is pumped into the neutralizer vessel where, under heat and agitation at 100 to 140 deg. F., free fatty acids are neutralized by caustic soda solution. After reaching the break, as defined by a sharp segregation of the foots formed, agitation and heating are stopped and the charge is allowed to stand overnight to settle the foots. The neutral oil is withdrawn and the foots dropped. The latter may be either discarded or boiled up into soap (Wurster & Sanger Inc., Chicago). Losses in neutralizing are roughly twice the free fatty acid content on oils containing up to 4 percent F.F.A. Neutral oil is charged to the bleacher where it is first washed with salt and hot water to break up emulsions and remove traces of soap remaining from the neutralization operation. Most of the wash water is removed through settling into an oil trap.

Washed oil is dried under heat and vacuum at 180 to 230 deg. F. and 100 mm. Hg absolute, and bleached by agitation with clay used in quantities from 2 to 6 percent of the weight of the oil. The total bleaching cycle is about eight hours. The bleached oil is filtered to remove clay which may retain, depending upon its type and extent of steaming, from 25 to 60 percent of its weight as oil.

The charge of bleached oil is delivered to the deodorizer where it is maintained at a temperature of 350 to 400 deg. F. and a vacuum corresponding to 10 to 15 mm. Hg absolute. Open steam, superheated to 425 to 450 deg. F., and in quantity somewhat less than ½ lb. per lb. of oil, assists in the removal of the volatile odorous constituents. The deodorizing cycle is 6 to 8 hr. The oil is cooled before exposure to the atmosphere, given a final filtration, and pumped to finished peanut oil storage.

In the processing of tung nuts, the raw fruit is stored in a well-ventilated building having a false floor covered with wire screen or metal grating to allow free circulation of air under and through the piled fruits. After six to nine weeks of this natural drying, the original 15 to 30 percent water content of the whole fruit is



Process by which Continental Commodities Corp. can produce either tung or peanut oil in new Madagascar plant

reduced to 8 or 10 percent. At this stage the moisture content of the kernels is 2 to 4 percent which is a satisfactory range for efficient processing. Another object of this seasoning and natural drying of the whole fruit is to facilitate mechanical decortication and separation of the kernels from the husks. The cleaning and preparation, and pressing of the tung nuts follow the same procedure as for peanuts except that different sets of plates are used in the disk huller and meat grinding mill, different screens are used in the separator-purifier, and the rotary dryer is bypassed. After pressing and filtration, finished tung oil is pumped to storage; no further refining is required.

The arrangement of equipment in the processing sections—cleaning and preparation, pressing, refining—follows the processing sequence closely. Equipment was selected to permit a production of approximately three tons of oil, either peanut or tung nut, per 24-hr. day. The can-making machines which are to make three sizes of can for packing peanut oil, namely, 1, 2 and 5 kilo, are arranged and located so that the fabricated cans are carried directly into the can storing and filling areas.

In the electric power generating section, which is the sole source of electricity supply for the plant, two diesel generator sets are located. Each diesel engine is rated 180 hp. at 600 rpm. at sea level, or 147 hp. at the plant elevation of 5,175 ft. Directly connected to each diesel engine is a 125 kva., 100 kw. at 0.8 power factor, 3 phase, 50 cycle, 240/480 volt, synchronous generator. One of the diesel generator sets serves as a spare for half the time.

In the steam generating section which supplies all of the steam for the plant are two oil-fired boiler units to generate steam at 150 psi. gage. Each has a capacity of 5,200 lb. of steam per hr. (150 boiler hp.) and one unit serves as a complete spare.

Solvent Safety

It is not news that troublesome skin injuries can result from the constant handling of most of the common organic solvents like gasoline, naphtha, benzene, turpentine, trichlorethylene, and carbon tetrachloride. But because blisters and sores are slow in developing and can ordinarily be cleared up by a few trips to the doctor, the safety department is sometimes prone to relax its vigil, and from time to time can stand a memo on the value of a few simple precautions.

The best approach, of course, is to arrange matters so that workers don't come into direct contact with solvents, but if this is impossible, and you are sure it is impossible, the first recourse is usually to protective clothing. In cases where gloves are objectionable, either because they are inconvenient or themselves cause skin irritation, the most satisfactory expedient is to cover the hands with a protective cream. It is important that both clothing and cream be selected for the particular job at hand, since both are prepared in several types and each type is resistant only to certain solvents.

Soap used to remove creams should not be strongly alkaline; it may contain a synthetic detergent and soft abrasives if necessary, but sharp abrasives and solvents should never be resorted to. After washing, it is well to apply an ointment consisting of half lanolin and half cold cream.

These measures, simple as they are, will, if strictly adhered to, suffice to prevent skin disorder in any normal worker. However, a few people are abnormally sensitive to solvents; a physician can spot these exceptional persons with a patch test and they obviously should be moved to other work not involving the use of solvents.

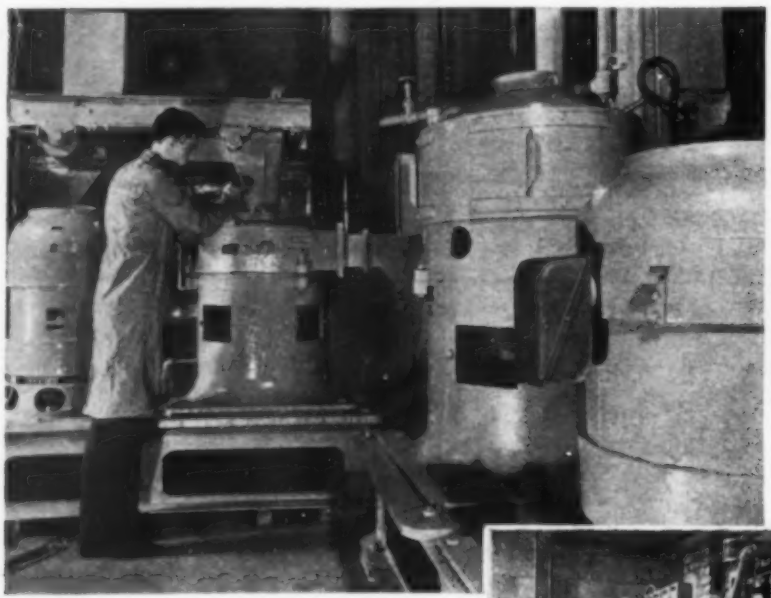
Pilot Plant For Study Of Unit Operations

By the end of 1945 the Allis-Chalmers Mfg. Co., of Milwaukee expects to complete the construction of a pilot plant which may well be the most elaborate experimental set-up of its kind ever established.

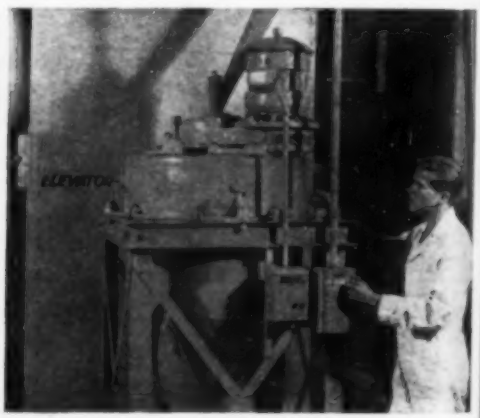
Functionally, the mill is divided into three main sections—crushing, grinding and concentration, and pyro-processing. Much machinery, for the most part standard commercial models, has already been installed, and when the project is completed it will include various types of crusher, grinding mill, vibrating screen, classifier, feeder, flotation and cyanidation equipment, and a 30-ft. model kiln.

Sample quantities of such materials as portland cement, ores, flour, sawdust, oil-seeds, wood pulp, plastic powders, and a host of others may be submitted to Allis-Chalmers for experimental processing in amounts ranging from 500 lb. to as much as 10 tons.

Permanently housed in a five-story building, the equipment is so arranged that it can handle materials either in batches or in a continuous flow.

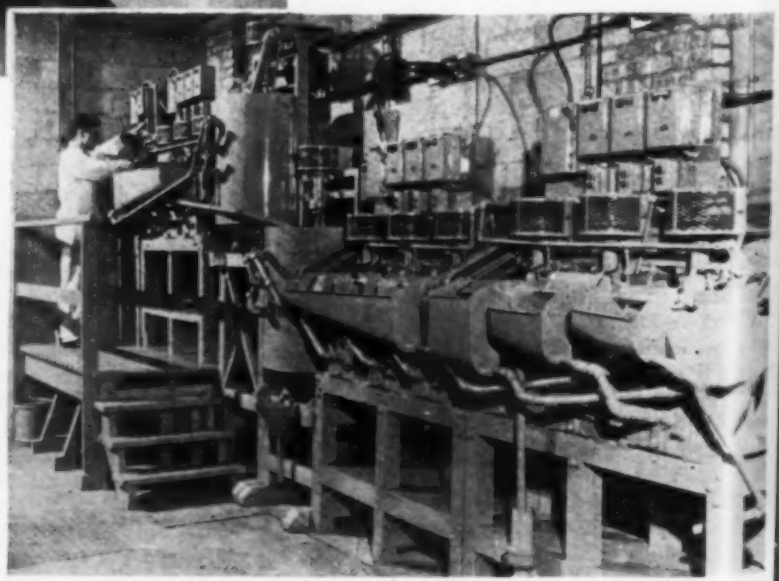


Inter-plane grinder (left). Can be adjusted to handle wide range of products by use of varying plate types. Machine at right is vertical hammer mill

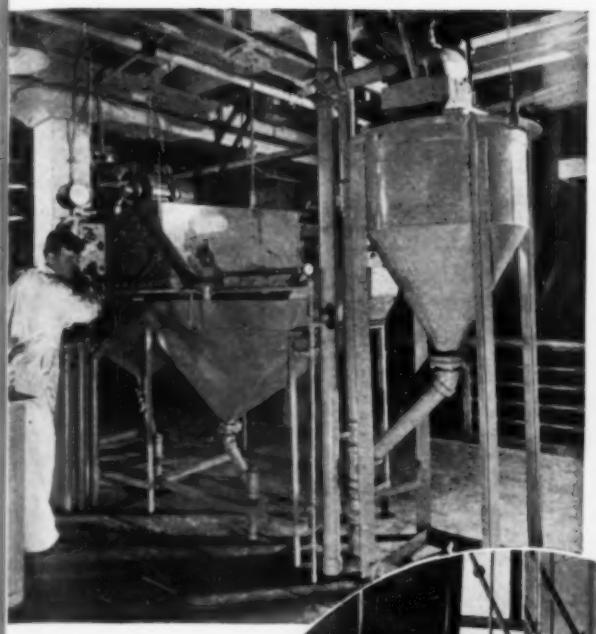


Air separator. Fed by elevator and operating in closed circuit with dry grinding mills, it can handle 500 lb. per hr.

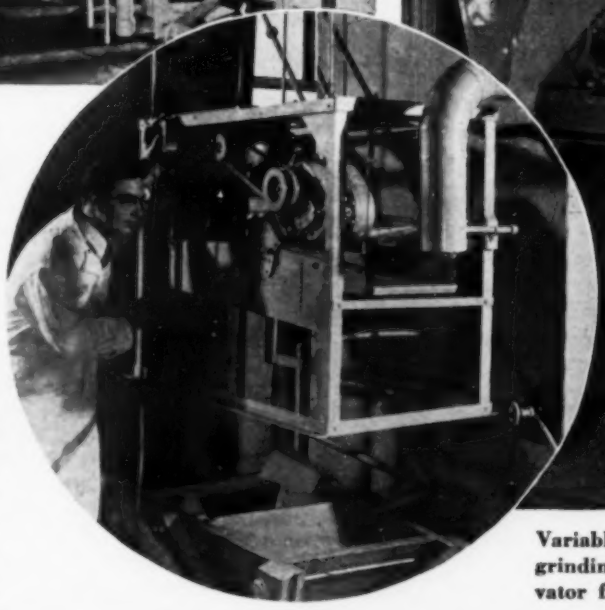
Gravity concentrating table. Feed may come directly from the grinding mill; or spigot products from the hydraulic classifier may be tabled separately



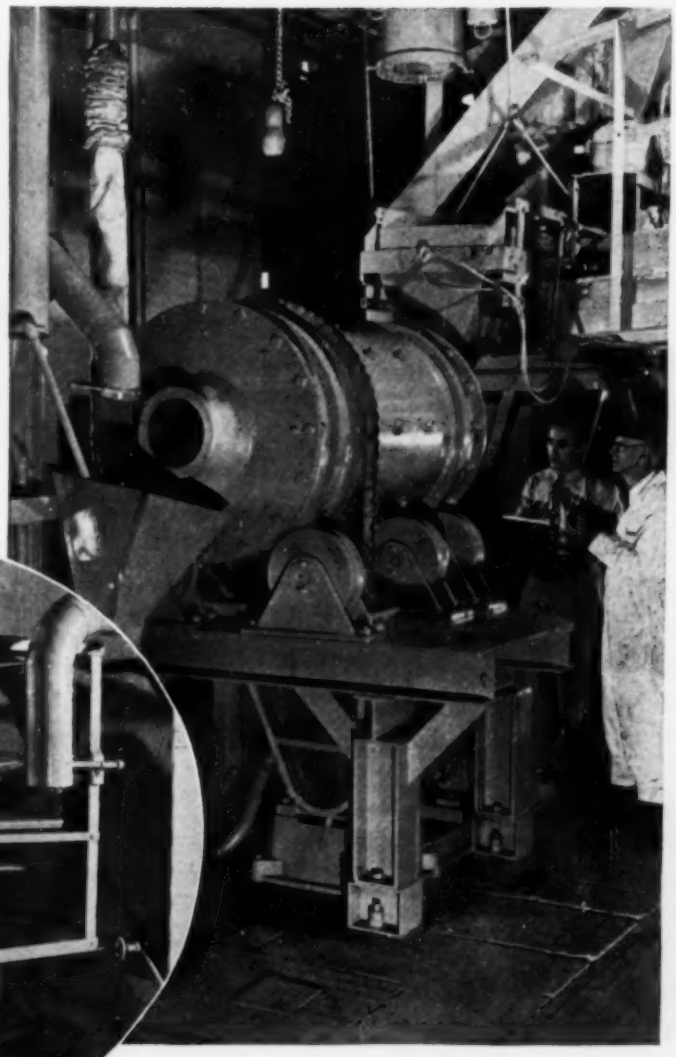
Two-mineral flotation circuit. Separation equipment also includes air separator, spiral rake, magnetic separators, and sink-float machines



Sink-float testing assembly. Suspension of finely ground heavy media in water floats light minerals, sinks heavy ones. Any type media may be used

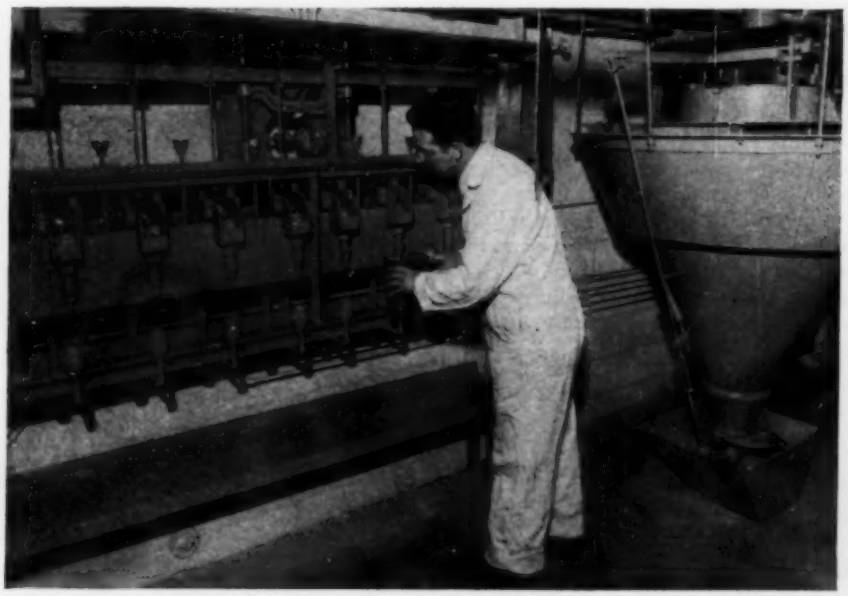


Right—Model low-head screen, hydraulic classifier, air separator. Receive ore from elevator or pump, operate in closed circuit with grinding mills



Variable-speed rod mill for either wet or dry grinding. Ground minerals pass to 40-ft. elevator for separation in open or closed circuit

Slurry tanks used for dissolving gold or silver from ore in cyanidation process. Discharge from tanks is pumped to separation or filtration



Feeder for liquid flotation reagents. Equipment is arranged for continuous flow of material from grinding section to various processing units

W. W. DUECKER *Texas Gulf Sulphur Co., New York, N. Y.*

SULPHUR

Important Material in Two World Wars

At the beginning of World War I practically all domestic elemental sulphur came from a single mine and total production was but little in excess of one-half million long tons. The urgency of requirements brought an expansion in mining operations and in the four years of war, sulphur mined amounted to more than 3,600,000 long tons of which more than two-thirds was produced in 1917 and 1918. During five years of World War II, more than 15,000,000 long tons were mined, all domestic requirements were met, export shipments to Allied nations were maintained, and a large stockpile held in reserve.—*Editors*

World War II has again focused attention on the importance of certain raw materials to the economy of the nation. Particular stress seems to have been laid on the production of many critical materials which had to be augmented with government aid. Little, however, was heard of sulphur, the element used in the manufacture of the sulphuric acid which is said to be the life-blood of industry. This was because the sulphur industry was prepared for the emergency and was able to furnish all needed supplies.

Practically all elemental sulphur, or brimstone as the element found in nature is called, was obtained during the war years, at least since 1940, by the Frasch or hot water process from five deposits located in the Gulf Coast region. The Duval Texas Sulphur Co. operated on a dome at Orchard, Tex. The Freeport Sulphur Co. mined sulphur at Hoskins Mound, Tex., and Lake Washington, La. The Jefferson Lake Sulphur Co. worked a deposit at Clemens, Tex. And the Texas Gulf Sulphur Co. operated at Newgulf, Tex.

Fifteen million tons were produced in the five years with a maximum of nearly three and one-half million tons in 1942. Besides this, there also was available to industry the sulphur obtained from other sources. For just as heat may be obtained by burning either gas, coal or oil, so also may sulphur gases for use in making sulphuric acid be obtained by burning either sulphur or pyrites, or by roasting sulphide ores in zinc or copper smelters. The quantity of sulphur which was made available to industry in the years 1940 to 1944 is therefore the total sulphur mined plus that available in pyrites and in roaster gases as shown in the accompanying tabulation.

These data, however, tell only part of the story for in addition to the quantities currently produced, there also were the stocks which producers maintained at the mines and at various storage points throughout the country. Based on year-end figures, these averaged 3,950,000 long tons for each of the six yearly periods ended Dec. 31, 1944. Of this quantity, which was actually more than any one year's total demand for American sulphur, over 70 percent was in the stockpiles of the Texas Gulf Sulphur Co. alone. Domestic consumption reached nearly three million tons in 1944. Yet in spite of this unprecedented demand, the industry was able to supply all the sulphur that was needed.

WORLD WAR I

During World War I the sulphur industry also was able to supply the demand, but some months before the Armistice, conditions had become critical. In 1914 the world's elemental sulphur requirements came from Japan, Sicily, and the United States. This country's production came chiefly from the original Frasch mine, operated by the Union Sulphur Co. at Lake Charles, La.—the Bryan Mound Texas deposit of the Freeport Sulphur Co. was just getting into production. Some was produced at surface mines in the far west and some was imported from Japan. Stocks of sulphur at mines, however, were not large, and exports although small were an appreciable percentage of total production and shipments.

Sulphuric acid in 1914 was made chiefly from domestic, Canadian and Spanish pyrites, although substantial quantities were made as a byproduct at zinc and copper smelters.

Comparing the record of the sulphur industry for the two wars, it is noted that approximately seven times as much elemental sulphur was mined in 1942 as in 1915. Prior to World War I, industry obtained most of its sulphur from pyrites. The quantity of elemental sulphur mined accounted only for about one-third of total

Apparent Domestic Consumption of Elemental Sulphur During World War Years*

LONG TONS

	1915	1916	1917	1918	1940	1941	1942	1943	1944
Mine Shipments	293,803	766,835	1,120,378	1,266,709	2,558,742	3,401,410	3,128,559	2,953,845	3,519,083
Byproduct	.....	.....	.....	.....	19,860	26,690	24,222	22,692	41,080
Imports	25,910	22,235	973	.....	27,845	28,631	25,632	16,658	.....
Total	319,713	789,070	1,121,351	1,266,709	2,606,447	3,456,731	3,178,413	2,993,195	3,560,163
Exports	37,312	128,755	152,736	131,092	746,468	729,464	568,249	654,393	653,686
Apparent Consumption	282,401	660,315	968,615	1,135,617	1,859,979	2,727,267	2,610,164	2,338,802	2,906,477

* Source of data, Minerals Yearbook.

sulphur requirements. As imports of pyrites declined due to submarine warfare, attempts were made to increase supplies of domestic elemental sulphur.

Although production of sulphur had increased about two and a half times, from 520,582 tons in 1915 to 1,353,525 tons in 1918, the situation was so grave in 1918 that sulphur was placed on allocation and the Texas Gulf Sulphur Co. was instructed by government officials to develop its deposits located near Matagorda, Texas. Work was initiated immediately, but it was impossible to bring the mine into production until late in March 1919, several months after the war had ended.

WORLD WAR II

No wide variations were experienced by the sulphur industry during the period 1940 to 1944 primarily because in the intervening years, elemental sulphur had become established as the main raw material of sulphuric acid manufacturers. Accordingly, it was unnecessary to replace as in 1914 any great tonnage formerly supplied by foreign pyrites producers. Likewise the capacity of the industry to produce had been so greatly expanded that as much was mined in one year as was produced during the entire period of 1915 to 1918. A record production of 3,460,686 tons was obtained in 1942 of which 53 percent was produced by the Texas Gulf Sulphur Co., the company which had been requested to start operations in 1918.

From 1942 to 1944 inclusive, the average annual "apparent domestic consumption" of elemental sulphur was 2,618,807 long tons compared with an average of 1,052,116 long tons for 1917 and 1918. Average exports for the same period were 625,442 and 141,914 tons, respectively. Such figures indicate the expansion of the chemical industry both here and among our Allies and the dependence of that industry upon American sulphur.

The sulphuric acid industry was largely responsible for this expansion, having doubled production, as compared with the last year of World War I. There was, however, a considerable shift in the sources of sulphur used by the industry. In the period 1915-1918 approximately 36 percent of all sulphur supplies were in the form of pyrites, 50 percent as native sulphur, and 14 percent was obtained from smelting copper and zinc. During World War II approximately 10 percent of the available supply of sulphur was in the form of pyrites; sulphur from domestic mines had increased to 80 percent and about 6 percent was obtained from smelters. Imports of sulphur and byproduct sulphur furnished the remainder. Pyrites was not only smaller percentagewise, but also in actual tonnage. The decrease in the quantity imported from Spain is attributed to limited shipping available and that from Canada was due to the exhaustion of one pyrite mine in 1943. There was no great change in sulphur available from copper and zinc plants.

Since 1917, several processes have been perfected for the recovery of byproduct sulphur from waste gases. One such source was the Consolidated Mining and Smelting Co.'s process used at Trail, Canada. The byproduct sulphur from natural gas and coke oven gas was largely converted to sulphuric acid. These sources provided about 50,000 tons of sulphur in 1940 and about 40,000 tons in 1944.

ORDNANCE NEEDS

Figures are not available to demonstrate the amount of sulphur which went directly to ordnance works in the two wars. In 1917-1918 ammunition plants obtained most of the required sulphuric acid from commercial sources. Government owned plants had in the summer of 1918 a capacity of 648,000 short tons of 100 percent acid, equivalent to about 195,000 long tons of sulphur and equal to about 13 percent of the 5,100,000 tons of acid produced during that year. As a direct comparison it may be noted that although 9,000,000 tons of 100 percent acid were produced in 1944, the war program for 1945 called for a further expansion of annual capacity of 550,000 short tons, which would call for about 165,000 more tons of sulphur.

This comparison does not, however, reflect the entire change that has taken place for since 1918, the quantity of acid required per unit of ammunition manufactured has decreased through increased efficiency in manufacturing operations. Furthermore, the nitric acid used in nitrating cotton and toluene was formerly made by treating Chilean nitrate with sulphuric acid, but now is made from synthetic ammonia by direct oxidation of atmospheric nitrogen without use of sulphuric acid.

As a result of such changes, experts have estimated that today four times as much smokeless powder or twenty-five times as much TNT can be made per pound of sulphur as in 1918. Despite this change, however, the total acid used in the production of ammunition in World War II was probably greater than in World War I, and the quantity produced in government plants in 1945 was somewhat larger than in 1918.

Although the war program called for further increases in an acid production that more than doubled World War I figures, there was no concern about an adequate supply of sulphur. The industry itself had so built up its stocks and productive capacity in the peace-time years that there was no need for further expansion and no occasion for government assistance. It could and did meet the greatly increased demands and in fact, enjoyed the distinction of supplying perhaps the only commodity that the government actually requested buyers to stock so as to ease future transportation demands.

Consumption of Sulphuric Acid, 100 Percent, By Industries*

SHORT TONS

	1918	1942	1943	1944
Fertilizer	1,324,000	1,835,000	2,500,000	2,620,000
Petroleum Refining	417,000	900,000	940,000	1,020,000
Chemicals and Defense	460,000	2,145,000	2,285,000	2,425,000
Coal Products	.....	605,000	580,000	620,000
Iron and Steel	435,000	510,000	535,000	560,000
Other Metallurical	182,000	350,000	360,000	340,000
Paints and Pigments	65,000	475,000	495,000	530,000
Industrial Explosives	1,680,000	120,000	115,000	110,000
Rayon and Cellulose Film	.....	390,000	415,000	450,000
Textiles	62,000	90,000	85,000	75,000
Miscellaneous	45,000	350,000	350,000	340,000
Total	4,670,000	7,770,000	8,660,000	9,090,000

* Source of data, Minerals Yearbook.

Sulphur In All Forms Made Available to Industry During World War Years*

LONG TONS

	1915	1916	1917	1918	1941	1942	1943	1944
Sulphur Mined	520,582	649,683	1,134,412	1,353,525	3,139,253	3,460,686	2,538,786	3,218,158
Pyrites Sulphur† (Imported)	463,000	597,400	464,300	239,400	180,700	147,100	125,600	88,600
Pyrites Sulphur† (Domestic)	165,500	177,900	194,300	195,000	271,000	302,500	337,000	331,200
Sulphur Equivalent‡ Byproduct Acid	188,700	240,500	300,500	307,500	207,000	218,000	271,000	255,000
Sulphur from Gases	.....	.....	.....	.....	26,690	24,222	22,692	41,060
Sulphur Imported	25,910	22,235	973	.....	28,661	25,632	16,658	.....
Total Available	1,363,692	1,687,718	2,094,485	2,095,425	3,843,274	4,178,140	3,311,736	3,934,018

* Source of data, Minerals Yearbook. † Sulphur content of imported pyrites calculated as 48 percent for 1915-1918, 49 percent for 1940-1944; domestic as 42 percent throughout. ‡ Sulphur content of 50 deg. Be acid calculated as 5.6 long tons of acid equals 1 long ton of sulphur for 1915-1918. Sulphur content of 60 deg. Be acid calculated as 4.4128 long tons of acid equals 1 long ton of sulphur for 1940-1944.

D. R. WILLIAMS *Plastics Development Division, The Dow Chemical Co., Midland, Mich.*

Properties and Applications of SARAN PIPE

For a little more than three years Saran pipe has been in the hands of industry and during that time it found wide use as a substitute for war-scarce piping materials. Thus in a short time it had abundant opportunity to show what it can do. Examination of its performance reveals promising applications and advantages as well as limitations.—*Editors*

First, a word to explain just what Saran pipe is. The resin from which the pipe is made is thermoplastic vinylidene chloride-vinyl chloride copolymer combined with suitable plasticizers, pigments, and the like. After extruding the blended pelleted resin over a mandrel and further forming with rolls and dies, the plastic, when sufficiently set, is stripped from the mandrel as a uniform, close-tolerance pipe. Fittings, made of the same resin, are produced in quantity by injection molding.

Salient features of the material—two good, two bad—are the ease with which it is fabricated, its good resistance to most chemicals, its very low thermal conductivity, and the low ceiling on the temperature it will stand. These characteristics and others are brought out in the case histories and tables which follow.

The most numerous uses of Saran pipe are instances in which its chemical resistance is utilized. In one case it is used in a vent carrying bromine fumes and subjected to normal Michigan weather conditions. After two years, the line is in good condition, whereas copper tubing previously used lasted up to six months.

In another application, 40 ft. of 2-in. pipe are used in a siphon line carrying up to eight percent HCl at warm temperatures under very little pressure. This line is welded throughout and has been in service for one year. It is in good condition and except for one faulty weld has given no trouble. Copper in the same line lasted up to six months. This case typifies one of Saran's most likely fields, the handling of HCl solutions.

Many installations involve simultaneous exposure to hydrochloric acid and solvents such as benzene, perchlorethylene, toluene, and many others. The material is insoluble in nearly all common solvents, though it will dissolve to a very limited extent (up to a 5 or 10 percent solution) in isophorone, cyclohexanone, hot ortho dichlorbenzene, and a very few other solvents of these types. Of the more common materials likely to be encountered in industry, a few ammonium compounds, especially strong ammonium hydroxide, have been found to have a deleterious effect and Saran pipe is not recommended in their presence.

In some cases the plastic pipe has not proved to be as satisfactory as other materials. In an installation in the Dow Chemical Co.'s plant, a gravity line carrying sodium diphenyl sulphonate was made up of 120 ft. of 2-in. pipe. Since this product forms a coating on the inside surface of any material used for the pipe line, it is necessary that the line be cleaned with steam about once a month. Saran, however, would not stand up to more than five or six cleanings and had to be replaced after six months with copper pipe, which, though it may not be as chemically resistant, will probably last longer under these particular conditions.

Another application, similar in that periodic steam flushings are encountered, has proven entirely successful. A system of siphon lines which carry filtrate water containing SO_2 and phenol uses 200 ft. of 2-in. Saran pipe. A 10-lb. head of steam is used to force this water into storage tanks. This results in the line's being subjected to steam at 200 deg. F. for a few minutes after each run of water is completed. Copper tubing was used in this line previously and lasted about one year. The present Saran line has been in operation for 16 months and shows no deterioration.

Quite extensive use has been made of Saran pipe in distilled water and treated water systems. It is entirely satisfactory for this purpose except in laboratories which cannot tolerate even very slight chloride contamination of the water. It has been found that distilled water on standing in ¼-in.-I.D. tubing picks up HCl (Saran being a chlorine compound) at the rate of 0.8 ppm. per hr. at the end of 30 hr. and at the rate of 0.01 ppm. per hr. at the end of 240 hr. Total pickup at the end of 240 hr. is about 55 ppm. It appears that Saran tubing or pipe can be used in this application, except in the most critical instances, by flushing a line before use if the water has been standing stagnant—and this is no more than good technique no matter what the piping material.

A property suggesting other uses for the pipe is its electrical resistance. Saran has been used extensively for water lines between mercury arc rectifiers and their heat exchangers. Formerly a length of rubber hose was inserted in the iron pipe line to prevent current leakage, but newer installations show that it is simpler and more practical to use Saran pipe throughout. Similarly, the material is finding increasing

Chemical Resistance of Saran Pipe at Room Temperature

Reagent	Stability Rating
Acetic acid: 10%, glacial	Excellent
Acetone	Fair
Air	Excellent
Ammonium hydroxide: 1%	Test in service
10%, 28%	Not recommended
Benzene	Fair
Bleaching solution	Excellent
Bromine water	Test in service
Calcium chloride	Excellent
Carbon tetrachloride	Good
Chlorine water	Test in service
o-Dichlorobenzene	Fair
Diethyl ether	Poor
Dioxane	Not recommended
Duponal: 10%	Excellent
Ethyl acetate	Fair
Ethyl alcohol	Excellent
Ethyl gasoline	Excellent
Ethylene dichloride	Fair
Ferrous sulphate: 15%	Excellent
Hydrochloric acid: 10%, 35%	Excellent
Linseed oil	Excellent
Lubricating oil	Excellent
Methyl iso-butyl ketone	Fair
Nitric acid: 10%	Excellent
65%	Good
Oleic acid: concentrated	Excellent
Sodium hydroxide: 10%, 50%	Good
Sulphuric acid: 10%, 30%, 60%	Excellent
98%	Fair
Sulphurous Acid: 5%	Excellent
Triethanolamine	Excellent
Turpentine	Excellent
Water	Excellent
Zinc hydrosulphite	Excellent

Stability rating is based upon observed changes in appearance, weight, dimension and hardness of samples tested. Chemical resistance decreases with rise in temperature.

Properties of Saran Resin

Specific gravity	1.65–1.72
Tensile strength, ultimate, psi	3,000–6,000
Compression strength at yield pt., psi	7,500–8,500
Elongation at yield pt., %	19–24
Flexural strength, psi	5,000
Specific heat, cal./deg. C./gm	0.32
Max. temp. in use, continuous exposure, deg F	160–200
Max. temp. in use, intermittent exposure, deg. F	180–200
Softening pt., deg. F	240–280
Distortion pt., deg. F	150–180
Dielectric strength:	
Short time, min., volts/mil	350
Step by step, min., volts/mil	300
Burning rate	Self-extinguishing
Effect of age, sunlight	Slight
Effect of metal inserts	Inert
Machinability	Good

Modulus of elasticity, tension, psi..... 40,000-80,000. Due to its flexibility, pipe runs of more than a few feet must be supported, as by running it inside an iron pipe, pipe half, angle iron, or wooden trough.

Impact strength, standard ASTM specimen, ft. lb./in. of notch ..... 0.15 at 0 deg. C.; 0.50 at 20; and 1.25 at 40 deg. C. Because of diminished impact strength at low temperatures, outdoor piping exposed to freezing temperatures should be supported and protected from sudden impacts. Many outdoor installations have been made and when so protected have given little trouble.

Thermal conductivity, cal./sec./sq.cm./deg. C./cm..... 3.0×10^{-4}. This is roughly 1/4,500 that of copper. Saran pipe is therefore unsatisfactory, except in rare cases, for cooling coils or condenser tubes, but on the other hand pipe carrying cold water shows no "sweating."

Thermal expansion and contraction, in./in./deg. C..... 19×10^{-5}. This is about 6 in./100 ft./50 deg. F., which is about 13 times that of steel. Expansion joints, which are now being developed, or U-bends should be used in long runs.

Weldability..... Excellent. Pipe may be welded by any of three methods: (1) Friction welding, in which a rapidly spinning piece of Saran contacts a stationary piece and generates heat to give a weld; (2) hot plate welding, in which two pipe ends are fused on any suitably heated plate and then joined together; (3) hot air torch welding, in which a specially designed torch directs hot air to a joint which is filled with molten Saran from a welding rod.

Threading..... Pipe can be threaded with standard pipe threading tools, two minor changes being recommended, i.e., the use of a longer guide sleeve and the grinding of cutting tools to produce a front rake angle of 5 to 10 deg.

Fittings..... Couplings, caps, 90-deg. elbows, 45-deg. elbows, tees, reducers in various combinations, and flanges are available in the same sizes as the pipe up to and including 2-in. Additional fittings and fittings for pipe larger than 2-in. are easily fabricated by hot plate welding. In general, the bursting pressure of fittings is equal or superior to that of pipe the same size, and leaking pressure of threaded joints is at least twice the working pressure of the pipe. Pipe dope should be used at all threaded joints for easy disassembly; one that has been found to work well is Crane Standard Black Thread Lubricant.

Hydraulic characteristics ..... Extensive tests show that the pipe is hydraulically smooth, the same as new seamless-drawn brass, block tin, lead, glass, and similar materials. Pressure drop follows the standard equation for hydraulically smooth pipe. (See "Graphical Solution to Friction Loss Problems in Fluid Flow," *Chem. & Met.*, March 1945, for a simple method for computing pressure loss.) Friction loss in Saran fittings, expressed as equivalent length of straight pipe, is somewhat higher than for standard iron pipe of the same sizes. This may be due to any or all the following: Low resistance to flow offered by straight run Saran pipe; presence of flash within fittings; sharp corners within ells and tees as contrasted with smooth corners in ordinary iron pipe fittings.

Tubing ..... In addition to the pipe, Saran tubing and tubing-fittings are available in several standard sizes from ⅛ to ¾ in. O.D. Properties such as chemical resistance, thermal expansion, electrical resistance, tensile strength, and resistance to heat are the same as for the pipe. It is characterized by toughness, flexibility, and high fatigue strength.

Data on Available Pipe Sizes

Standard Nominal Size, In.	Bursting Pressure, At 25 Deg. C., psi.	Working Pressure, psi.	Calculated Lb./Ft.	O.D., In.	I.D., In.
¼	1300	260	0.236	0.840	0.546
½	1060	210	0.320	1.050	0.742
1	970	190	0.475	1.315	0.957
1¼	820	160	0.650	1.660	1.278
1½	740	150	0.790	1.900	1.500
2	620	125	1.090	2.375	1.939
2½	570	115	1.805	2.875	2.277
3	510	105	2.480	3.500	2.842
3½	470	95	3.010	4.000	3.307
4	460	90	3.760	4.500	3.749

use in natural gas lines and like applications where electrolytic corrosion phenomena exist.

Among other applications are dipping racks fabricated from Saran pipe for use in corrosive baths and several thousand all-Saran double-pipe condensers. While its very low thermal conductivity normally excludes Saran from heat transfer applications, there are some cases where its excellent chemical resistance indicates its use.

There are other uses for Saran, in addition to pipe and tubing materials, which should be noted in passing. Extruded tapes and simple symmetrical shapes are produced for masking and reinforcing purposes. Injection and compression molded pieces are being fused for such things as paint spray gun handles and closures where its chemical resistance is valuable. Oriented monofilaments make resistant screens, conveyor belts and dipping nets. Filter cloth is being developed for applications requiring resistance to acids, alkalis and solvents.

The number of applications for Saran has been great, and it is impossible to cover them all, but those cited here are sufficient to indicate its field and to demonstrate the qualities with which it expects to meet the return of conventional piping materials.

Wartime Substitutes for Optical Glass

A MAJOR achievement of the war period was the development of optical plastics, satisfactory for high precision military equipment, which could be turned out in mass production. This advance, comparable to the accomplishments of this industry during the first world war, resulted from a research program started in 1940 under the direction of the National Defense Research Committee.

Optical plastics, already available for certain peace time uses, seemed a likely substitute for glass and showed promise of mass production as well as of meeting the stringent requirements of military service. These include perfect optical characteristics, stable under varied conditions of temperature and pressure, together with the ability to withstand shock and rough treatment. Early in the program it was necessary to set up a system of rating various plastics to determine their suitability. Important characteristics upon which the final ratings were based include homogeneity, resistance to water absorption, hardness, softening temperature, toughness, absence of color, ultraviolet stability, ease and degree of polymerization, and others. Of the 113 compounds synthesized and tested, 17 were investigated thoroughly but only two, polycyclohexyl methacrylate (designated as CHM) and polystyrene, were found suitable for precision optics.

CHM is superior to all other materials in having low water absorption, as well as low shrinkage on polymerization. Its high boiling point (210 deg. C.) makes possible polymerization at high temperature without causing bubbles due to boiling. As a result, CHM can be cast with satisfactory internal and surface homogeneity, although the best methods for polymerizing use relatively low temperatures and high concentrations of polymerization catalysts. CHM rates well on practically all manufacturing considerations, but it still has a low softening temperature (about 70 deg. C.), is easily scratched and abraded and rates poorly on toughness. Polystyrene was selected to supplement CHM in the design of achromatic lens systems.

New methods were devised to take advantage of these improved materials to overcome poor surface quality and low internal strength. Most important were: (1) partial polymerization before molding, (2) use of catalysts which make polymerization possible at low temperatures and pressures.

The finished plastic element retains to a high degree the characteristics and perfection of the pyrex glass mold which is made by precision optical methods. The inherent economy of the process lies in the repeated use of the same molds and in the production of finished elements in one simple series of operations.

Surface hardening of certain plastics has been accomplished by exposing the object alternately to water vapor and a mixture of silicon tetrafluoride with ozone which forms a hard film on the surface.

FROM THE VIEWPOINT OF THE EDITORS—

S. D. KIRKPATRICK, Editor • JAMES A. LEE, Managing Editor • THEODORE R. OLIVE, J. R. CALLAHAM, Associate Editors • HENRY M. BATTERS, Market Editor
L. B. POPE, RICHARD W. PORTER, JACK V. HIGHTOWER, EDMOND C. FETTER, Assistant Editors. • R. S. McBRIDE, Consulting Editor

OPPORTUNITY vs. ISOLATION

MANY young men in science are torn between the desire to have an independent academic or institutional position and the desire to reap the greater money reward of research employment in industry. Not infrequently these young men are discouraged in their thoughts of industrial employment by a wrong impression as to the personal and professional limitations imposed.

There are, of course, certain necessary limits on freedom of publication and on outside discussion of company problems with fellow scientists who work for competitive firms. There is no way to eliminate the need for some of that sort of secrecy. But the result need not be any monastic isolation of the individual provided both discretion in the employee and good sense in the employer are maintained. In fact the employer has everything to gain from encouraging his research staff to take part in all sorts of professional activities. They should attend conventions, present scientific papers, publish articles in the professional magazines, and make aggressive, conscious effort to build their own individual professional prestige. Advantage so gained for the individual is also of advantage to the employer.

Perhaps every employer of technical workers should make a more considered effort to see that each member of his staff does have the stimulus of full professional contact, helping him to grow in reputation as well as in value to the employer. It is likely that the problem here discussed is largely the fault of the directors of engineering and of research who have not made enough effort to train and inspire their fellow workers.

CHEMURGY OR CHAOS

"AMERICAN agriculture emerged from this war geared to produce 30 to 35 percent more than before Pearl Harbor. . . . We have had a veritable revolution in production. This revolution is not reversible. We neither want nor can we go back to prewar days. Wartime production levels in agriculture will tend to persist regardless of economic conditions. Total farm production is responsive to increased prices or income. But, once expanded, it is not quickly responsive to low prices or depressed conditions."

Thus an official spokesman of the Department of Agriculture talked to the National Retail Farm Equipment Association in St. Louis on October 23, frankly admitting that we can expect to have large surpluses of agricultural materials offered on the market regardless of domestic demand. For this there can be only one answer. New uses must ultimately be developed. Only for a time will the surplus find a market abroad or be used through UNRRA for relief. After that there will be either chemurgy or chaos.

Chemical engineers must prepare to apply new science for the conversion of these farm surpluses into non-food products in large quantity or the agricultural population of America will suffer sadly. There seems to be no escaping this responsibility, because we know that the official interpretation is correct. Farm producers will not turn back to low yields or small crop practices. It is a serious prospect both for agriculture and for chemurgy.

PATENTS FOR PUBLIC USE

GOVERNMENT research should not be directed primarily to the getting of patentable results. But a great deal of this work properly and effectively planned does produce intentionally such end products. When that is the case the government has the obligation of conserving the patentable result for the benefit of the public.

Patentable results do not belong to the individuals who have obtained them while being paid from the public treasury. Nor should such results be allowed to pass to private control of some single outside agency through the neglect of official responsibility. Instead they should be recorded and generally it is wise that they be placed in patent form so that their origin in the government work may be a matter of official record at the Patent Office.

When such a patent is obtained from government work it may be dedicated to the public. It is then only a little more than the equivalent of a technical article printed in an appropriate magazine. There is, however, the definite advantage that the Patent Office will always have this information brought forcibly to its attention if someone else later seeks a patent on the same idea. This, in fact, is the major reason for having the government men take patents.

But under conditions which frequently arise there is a greater advantage in having the patent taken by the government reserved in a certain measure by having it assigned to a public official or a public agency for administration. In a number of cases the application of such an idea requires careful control to insure success. Failures through neglect of essentials may unduly discourage the use of the patent or may actually bring the inventor and his bureau into some measure of disrepute. To prevent these results, unfair to individual or government or public, control by public officials is sometimes necessary. But this control should merely be to insure proper use and not to prevent equal right of use by all who seek to employ for the public benefit the results disclosed in the government patent. Probably this control must grant only non-exclusive licenses under equal terms to all proper persons who apply.

These matters are of great importance just now. It is to be hoped that the congressional discussions on a new

Research Foundation will further clarify these facts and perhaps make them a part of established federal law. Also needing attention is the still larger question (which is not discussed here) of what to do with patentable results in which the government merely participated in part or to which government men contributed only indirectly. This, of course, was one of the most controversial issues in the original Kilgore bill and many hold that the ultimate solution must be found in separate legislation based on thorough study by other committees of the Congress.

PIPELINE WARFARE

During October two great pipelines built for wartime movement of petroleum were shut down and emptied of oil by pumping water into them. Thus "Big Inch" and "Little Big Inch" lie idle awaiting disposal as surplus property.

These events represent in essence a declaration of war between two conflicting groups. One wishes to put these lines back to work for the movement of fluid fuel, either gas or oil, from Texas to the industrial East. The other group wants to forbid this use lest the fluid fuel compete unduly with coal mining, rail transportation of coal, and the solid fuel industries in general.

Chemical and process industries might very largely profit from greatly increased supplies of low-cost natural gas in the territory between Richmond and Boston. Certainly one of these lines could usefully be put to work to bring low-cost gas to this region. The difficulty is to find a sufficiently important group which is able to hold its own against critical comment and the violent attack of those who do not want this new factor introduced into the competitive fuel supply of the eastern states.

It is not easy to guess all of the important areas of controversy. It is still less feasible to say just how this established economic means of gas transportation can best be put to work. But those who are would-be users of gas might well investigate the possibilities in such a program. And in a similar manner those who want one of the lines put back into the petroleum transport business can well inquire similarly into that subject. But neither group favoring gas or oil should expect an easy time in getting its desired arrangement. The opposition is very powerful indeed.

THE ALCOHOL LOBBY

Process industries are again confronted with the political pleas and the economic distortions of certain advocates of the farm-alcohol group. That group is undertaking again to establish arrangements for continued operation of certain alcohol plants which have proved that they cannot operate with economic success even in wartime. They are striving to fix it up so that higher costs for synthetic rubber from alcohol and other such variations from normal development, shall be imposed on our industries despite the resulting increase in other costs and the danger to war-born business.

One of the latest moves has originated in the effort to make potato sugar and wheat sugar in these alcohol plants. The claim is that this will save potatoes and soft grain that would otherwise be thrown away or used ineffectively. Were these proposals merely temporary palliatives for surplus disposal they would not be subject to much criticism. But they are being used also in an effort to perpetuate operation of these government plants without regard for economy or industrial needs.

One great danger to the American public in this effort is that the cost of synthetic rubber in the United States may be made to appear so high that this new industry may be repudiated, with a consequent return to dependence on Java and Malaya. Almost equally serious is the burden on the taxpayer whose tax money buys up surplus crops through price support programs that are unsound in the beginning and that cause great leaks from the Treasury while they also perpetuate bad agricultural planning.

The chemical profession is in the best place to point out the viciousness of these practices. We could do so most potently by explaining to our congressmen and senators that we do not like to see our funds used in this manner. And we can say with truth and some chance of conviction that it is largely the taxes of the industrial areas which are so being dissipated with damage to sound agriculture.

BETTER COLLEGE COURSES NOW

S.P.E.E. and others have long been talking about better postwar training of engineers. Now is the time when the colleges and universities can do something about it. Never before has there been a better opportunity for complete rebuilding of the curricula to take advantage of modern teaching and the best thinking available as to the arrangement of courses of study.

We note with some satisfaction that Rensselaer Polytechnic Institute has done something of this sort. They have taken seriously the argument that a graduate in engineering should be prepared to take his place as a cultured citizen of the community. In its new curricula, R.P.I. has introduced a substantial number of cultural courses in economics, history, psychology, literature, and other humanities. About 17 percent of the curricula will deal with these non-technical subjects, at least one course being a part of every term schedule.

Rensselaer also is emphasizing in its new curricula the need for training in fundamentals. There will be more emphasis on mathematics and basic sciences with somewhat less attention to the so-called "practical" courses. We believe that this is a sound step forward because the graduates will rapidly be made acquainted with the everyday use of their fundamentals when they get their first jobs. To be sure, they must know how to solve problems, but it is not so important that they be given extended and repetitive experience during their college training. We do not mean by this that we disapprove of the "co-op courses." They have great merit. But even that sort of a course falls down if the campus portion of the training period neglects sound education in fundamentals.

Never before has there been so great a need for properly trained brain-power. Never before has the responsibility of the college faculty been so great to help in determining the future of American opportunity. We hope that there will rapidly develop an effective cooperation between industrial users of engineering talent and those who train the young men on whom tomorrow's responsibilities must rest.

CHEM. & MET. PLANT NOTEBOOK

THEODORE R. OLIVE, Associate Editor

$50 WAR BOND FOR A GOOD IDEA!

Until further notice the editors of *Chem. & Met.* will award a $50 Series E War Bond each month to the author of the best short article received during the *preceding* month and accepted for publication in the "*Chem. & Met. Plant Notebook.*" Articles will be judged during the month following receipt, and the award announced in the issue of that month. The judges will be the editors of *Chem. & Met.* Non-winning articles submitted for this contest may be published if acceptable, and if published will be paid for at space rates applying to this department. (Right is reserved, however, to make no award in months when no article received is of award status.)

Any reader of *Chem. & Met.*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable material must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible. Neither finished drawings nor polished writing are necessary, since only appropriateness, novelty and usefulness of the ideas presented are criteria of the judging.

Articles may deal with any sort of plant or production "kink" or shortcut that will be of interest to chemical engineers in the process industries. In addition, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address entries to Plant Notebook Editor, *Chem. & Met.*, 330 West 42nd St., New York 18, N. Y.

OCTOBER WINNER!

A $50 Series E War Bond will be issued in the name of

H. F. REICHARD
Chemical Engineer
Milltown, N. J.

For an article dealing with a simple means of increasing output of a drum dryer has been judged the winner of our October contest.

This article will appear in our December issue. Watch for it!

September Contest Prize Winner

HOW AN EDUCTOR OR ASPIRATOR CAN BE MADE FROM RUBBER OR OTHER NON-METALLICS

J. A. MAY
Chemical Engineer
Lake Jackson, Texas

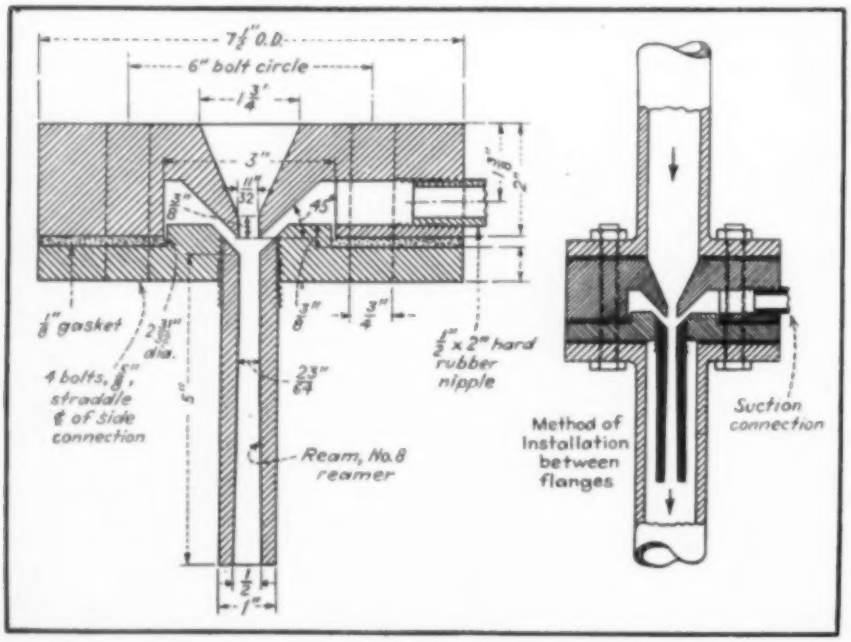
BELOW are sketched the details of an eductor or aspirator adapted to manufacture in any plant shop from non-metallic materials. The design which is somewhat unusual was developed by the writer to pick up a small acid side stream which at that time was going to the sewer.

Recovery by gravity flow was not possible and an acid pump was felt to be impractical. The logical solution seemed to be to use an eductor; but no commercial item seemed quite to fit our needs. An eductor was thereupon fabricated from glass but although it functioned satisfactorily, it was too fragile to be installed permanently. After trying unsuccessfully to design a more suitable glass eductor, the design herein presented was ultimately worked out for fabrication from other suitable materials.

Several such eductors made out of Haveg and hard rubber (ceramics might also be used) have been installed and have given excellent service. For the particular job in question, the eductor was designed to pick up 2 g.p.m. of acid solution under 15 ft. suction head and it was installed between flanges in a 2-in. rubber-lined pipe through which there was a normal flow of 20 g.p.m. at a line pressure of 25 ft. of liquid.

The design can readily be adapted to various conditions of flow and service. In additional to having suitable mechanical strength it has other advantages including: simplicity; ready fabrication from any suitable material; easy installation between pipe flanges, and accessibility of all parts.

Details of non-metallic eductor for aspirating liquids

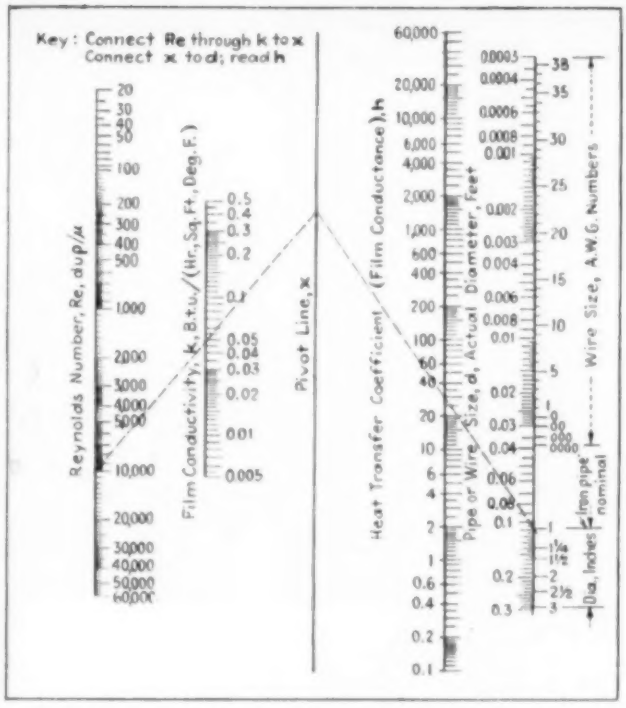


QUICK MOISTURE TEST FOR COAL AND MINERALS

R. H. SCHALLER
Aliquippa, Pa.

WHEN it is necessary to make numerous quick determinations of extraneous moisture in coal and other mineral products the method described here is satisfactory:

Add fine quick-lime to several pounds of the coal or other material and stir well with a thermometer in a well insulated vessel for several minutes. When the maximum temperature above the original coal temperature has been reached, the percentage of moisture can be read directly from a previously prepared curve.


Key: Connect Re through k to x
Connect x to d; read h
Reynolds Number, Re, duρ/μ
Film Conductivity, k, B.t.u./(Hr., Sq. Ft., Deg. F.)
Pivot Line, x
Heat Transfer Coefficient (Film Conductance), h
Pipe or Wire Size, d, Actual Diameter, Feet
Wire Size, A.W.G. Numbers
Iron pipe nominal Dia., Inches

Nomograph giving forced convection heat transfer coefficients for pipe and wire

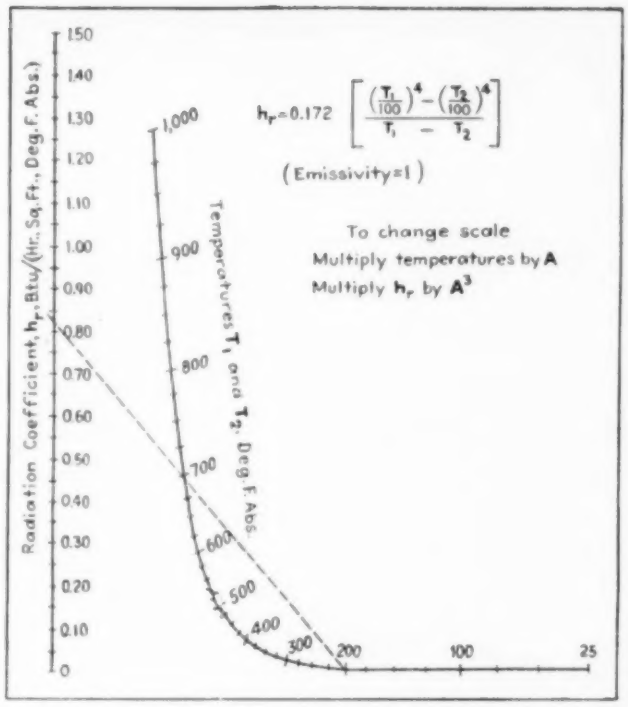

$h_r = 0.172 \left[\frac{\left(\frac{T_1}{100}\right)^4 - \left(\frac{T_2}{100}\right)^4}{T_1 - T_2}\right]$
(Emissivity=1)
To change scale
Multiply temperatures by A
Multiply h_r by A^3
Radiation Coefficient, h_r, Btu/(Hr., Sq. Ft., Deg. F. Abs.)
Temperatures T_1 and T_2, Deg. F Abs.

Chart for determining the coefficient of heat transfer by radiation

To prepare the curve fill the insulated vessel first with dry coal, then with other samples containing increasing known moisture contents, reading for each the temperature rise.

LIQUID SEALED VENT FOR ACETIC ACID TANKS

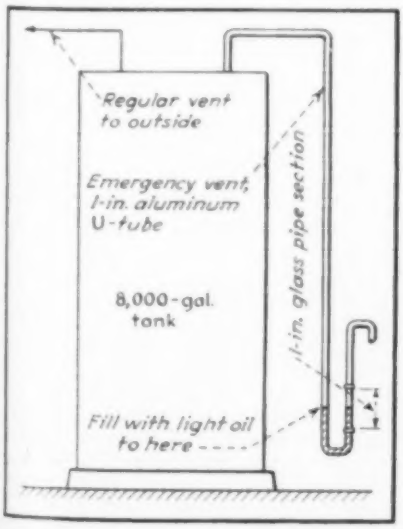
W. TARPLEY
Works Superintendent, Schering Corp.
Bloomfield, N. J.

IN OUR FACTORY we store glacial acetic acid in 8,000-gal. aluminum tanks which are vented to the out-of-doors. These tanks will stand only about 5 lb. pressure or vacuum. We have experienced plugging of the vent line in the wintertime due to condensation and freezing of acetic acid vapors in that part of the line which is outside the building. In one case we partially collapsed a tank due to the vacuum created when pumping from it with the vent clogged. We installed steam tracers on the tank vent so that freezing would not take place. However we wanted some extra protection in case this failed to work in very cold weather.

Our first effort to solve the problem was to try to secure a rupture disk but no rupture disk could be obtained which would break at less than 5 lb. pressure or vacuum. Several types of pressure and vacuum relief valves could be had in the desired range but these had the objection of moving parts which could stick due to corrosion and thus fail to operate. We finally put in an indoor vent attached to a U-tube of 1-in. Saran or aluminum pipe. This U-tube was filled with light oil to such a height that when the pressure or vacuum in the tank reaches 1 lb., it will vent through the U-tube.

The head of oil in the U-tube prevents fumes from entering the tank room, unless the tank vents, and also prevents moisture from getting back into the glacial acetic acid.

Liquid Sealed Vent On Acid Tank


Regular vent to outside
Emergency vent, 1-in. aluminum U-tube
8,000-gal. tank
1-in. glass pipe section
Fill with light oil to here

HEAT TRANSFER COEFFICIENTS FOR PIPE AND WIRE

IRA J. HOOKS and FRANK KERZE, JR.
Department of Chemical Engineering
New York University
New York 53, N. Y.

A SIMPLE equation for forced convection heat transfer coefficients for pipe and wire is

$$\left(\frac{hd}{k}\right) = a\left(\frac{du\rho}{\mu}\right)^b$$

where h is the film coefficient in B.t.u. per hr., sq.ft. and deg. F. temperature difference; d is the diameter in feet; k is the film conductivity in B.t.u. per hr., sq.ft. and deg. F. temperature difference per ft. of thickness; u is the velocity, ft. per sec.; ρ is the density, lb. per cu.ft.; μ is the viscosity, lb. per ft. sec.; and a and b are constants.

The terms in parentheses in the above equation are the Nusselt and Reynolds numbers respectively, and other consistent sets of units may be employed. The values of the constants a and b incorporated in the nomograph are: For Re less than 250, $a = 0.764$ and $b = 0.41$; for Re greater than 250, $a = 0.282$ and $b = 0.585$.

For the sake of simplicity the Reynolds number calculation has been omitted from the chart since its scale here is irregular. It may readily be obtained from other nomographs.

As an example of use of the chart the dotted line shows the case where $Re = 10{,}000$, $k = 0.05$ and $d = 0.1095$ ft., the external diameter of 1-in. i.p.s. pipe. The value of h is seen to be 28.0.

REFERENCES

1. King, W. J., *Mech. Eng.*, 413 (1932).
2. Bailey, N. P., "Principles of Heat Engineering," p. 192, John Wiley & Sons, Inc., New York.

RADIATION COEFFICIENT NOMOGRAPH

MELVIN NORD
Chemical Engineer
Matawan, N. J.

FOR radiant heat transmission between solids in cases of black body radiation where the emissivity is taken as unity, the equation for the coefficient is

$$h_r = 0.172\left[\frac{\left(\frac{T_1}{100}\right)^4 - \left(\frac{T_2}{100}\right)^4}{T_1 - T_2}\right]$$

where the coefficient h_r is expressed in B.t.u. per hr., sq.ft. and deg. F. temperature difference between the surfaces, and the temperatures T_1 and T_2 are respectively the temperatures of the warmer and colder surfaces, expressed in deg. R. (deg. F. abs.). (See W. H. McAdams, "Heat Transmission." 1st ed. p. 61.)

The equation was set up in the form of a determinant which showed that the h_r axis must be a vertical linear scale, while the T_1 and T_2 scales must coincide. The nomograph was then constructed from the parametric equations so obtained. The chart, reproduced here, shows an example by means of the dotted line. If the temperatures are respectively 700 and 200 deg. F. abs., the radiation coefficient h_r will be 0.83. If it is desired to change the temperature scale, it is only necessary to multiply the temperatures by Factor A, and then multiply the coefficient h_r by A^3.

METHANOL-WATER SOLUTIONS SOLVED BY NOMOGRAPH

W. C. FRISHE
Alabama Polytechnic Institute
Auburn, Ala.

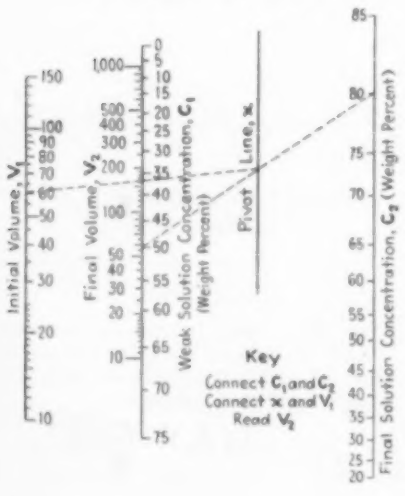
METHANOL-WATER solutions are ordinarily made up by pumping pure methanol from the storage tank or drum into the make-up tank which contains water or a dilute solution of methanol in water. The determination of the final volume of solution for a given final concentration requires temperature and gravity measurements and looking up densities in a handbook. By means of this nomograph one can determine quickly the final volume of solution if he knows the initial volume of weak solution, the weak solution concentration, and the final concentration to be made up. In the example shown on the chart:

If pure methanol is to be added to 60 gal. of a 50 weight percent solution of methanol in water and it is desired to raise the concentration of the dilute solution to 80 weight percent, what will the final volume be? Here V_1 is 60 gal., C_1 is 50 weight percent and C_2 is 80 weight percent. As shown by the dotted line on the nomograph, V_2 is 163 gal. This means that if pure methanol is added to 60 gal. of weak solution until the volume is 163 gal., the final concentration will be 80 weight percent.

It is assumed that mixing will be complete, and that the initial and final temperatures will be the same between 10 and 30 deg. C. Obviously, the chart can be used also to find the final concentration if the final volume, and initial volume and concentration, are known.

The chart is based on data for 20 deg. C. from Perry's "Chemical Engineers' Handbook," 2nd ed., p. 448 (McGraw-Hill Book Co., New York, 1941).

Nomograph to simplify making up methanol-water solutions



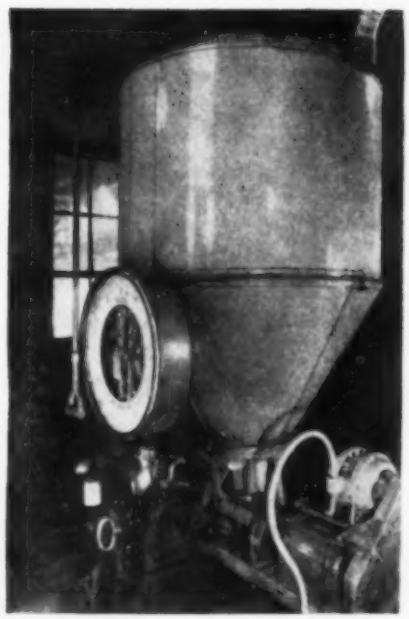


Fig. 1. Left—Feed wheel and drive mounted on scale

Fig. 2, Right—Complete activated carbon feeder showing feed hopper, feeder mechanism and scale

DRY FEEDER DEVELOPED FOR ACTIVATED CARBON

EDWARD ENGSTROM
Filtration Plant Foreman
Fridley Filtration Plant
Minneapolis, Minn.

POWDERED activated carbon is a difficult material to feed because of its light, porous and dispersive character. Furthermore, it tends to arch in the feed hopper. Various dry feeders intended for handling alum and other chemicals have been adapted with varying degrees of success, and sometimes the material is fed as a water suspension. Several machines were tried at the Fridley municipal water plant in Minneapolis with rather disappointing results so it was decided to build a machine of entirely new principle. Several months of successful use have shown that it does away completely with earlier troubles.

The hopper of the machine itself is fed from a large storage bin of 10 to 15 tons capacity. The hopper, together with the feed mechanism proper, is carried on a scale and is filled from the bin through a discharge spout containing a sliding gate. The spout is connected to the hopper through a leakproof flexible connection. The air vent back to the bin from the hopper and the spout discharging to the solution box also have flexible connections.

Equipment actually supported on the scale consists of the feed hopper, feed measuring wheel, discharge spout, variable speed drive and drive motor. Fig. 1 shows the feed measuring wheel with its three identical compartments and the speed regulator and motor, mounted on the scale. Fig. 2 shows the addition of the hopper and discharge spout. The wheel, revolving clockwise, fills directly from the hopper and each compartment during each revolution discharges once through an opening of the same size into the discharge spout. The hopper sides are steep enough to prevent arching and dustless filling of the hopper is assured by the flexible connections. The hopper is easily refilled during operation by recording the scale reading, opening the storage bin gate and allowing carbon to enter until the desired weight is shown on the scale. Carbon may be fed at rates from as low as 8 to 156 lb. per hr.

A RECENT issue of *Factory Mutual Record* describes a method of protecting coal piles from fires that has been used by Buick Motor Co. The method now employed, which is the generally recognized one of storing the coal in layers levelled and compacted with a bull dozer, makes fires unlikely because air is excluded. Previously, with the coal loosely stored, a novel system of open sprinklers was used. A portable pipe system, supplied by a hose line, would be put in place on the pile in event of a fire and would require no further attention. Less water was needed than with hoses and fires did not rekindle.

Editor's Note: This article is abstracted from a considerably longer article by the author appearing in the August 1945 issue of *Taste and Odor Control Journal* published by Industrial Chemical Sales Div. of West Virginia Pulp and Paper Co.

REPORT ON.....

HANDLING MATERIALS

With Lifting, Tiering and Special Trucks

Practically every method of handling materials saw the development of new equipment and new techniques during World War II, for it was a war of supply as much as of weapons of destruction. No branch of materials handling science, however, moved ahead more radically than the comparatively new group of procedures that make use of materials loaded on to platforms such as pallets, skids and special containers, which then are lifted and transported by specialized hand and power trucks capable of reaching under the load. In addition to transporting, some types are able also to stack loads high for space conservation. Developments in equipment were not numerous, but in techniques they were extremely far reaching, particularly in package simplification, in reduction in ship and freight car turn-around time, and in production of unitized loads for shipment without manual re-handling.

ALMOST everyone who knows anything of the technical achievements of the war period just past has offered his nomination for the most important "secret weapon" of them all. To some people it is the bull dozer, to others the jeep, to still others the airplane, the rocket or the atomic bomb. But behind all the offensive weapons of the war were the tools of industry and of the services of supply. Marvels of production and procurement demanded marvels of materials movement and transportation. At least in this last classification top honors certainly must go to a family of materials handling devices which, although known and used extensively before the war, have surely reached maturity of application since 1940.

Most versatile of any class of materials handling equipment, the family of gadgets for lifting, transporting and tiering loads saw more development in techniques of use and gained greater recognition, during the years of the war and the preparation for it, than in all their previous history. Much of this is due to the fact that both Navy and Army saw the tremendous possibilities in "unit loads" and the equipment for lifting, loading and stacking such aggregations of material with a minimum of re-handling and of manpower. Officers responsible for supply in both branches of the service were extremely active, both in adapting the handling equipment to the materials, and in adapting packages to the capabilities of the equipment. This last phase was carried considerably farther than would be possible for ordinary peacetime shipments, but it suggests nevertheless that many opportunities exist for package and pallet standardization in the postwar period. These must be explored thoroughly if the full benefits of the new handling techniques are to be secured in ordinary industrial use, as they were in war material transport.

Numerous handling improvements were introduced in individual Army depots, although these are not so well known to the general industrial public as those developed and advocated by the Navy Bureau of Supplies and Accounts, in Washington, and by the Naval Ordnance Materials Handling Laboratory, at Hingham, Mass. The last named organization, set up for packaging and materials handling research by the Bureau of Ordnance, worked out many techniques, trained officers assigned to materials handling duties, and personnel who were to operate the handling equipment; it developed packages, and methods of avoiding or minimizing packaging through the use of unit loads; and it passed its findings along to industry, both through personal consultation and through the pages of its monthly magazine, *The Palletizer*, which has circulated widely in the services and among Navy contractors since February 1944.

Common to all the equipment to be discussed in this report is the fact that it is "self loading" to the extent that the load, once it has been stacked on a pallet, skid or similar platform, can be picked up directly by the equipment without manual labor. As will be discussed at another point, the equipment has two main sorts of functions: either picking up a load, transporting it to another point fairly close to the first and setting it down again; or adding to the above the function of elevating the load high enough to stack it on another load to conserve space in storage or shipment.

Skids and the equipment for handling them considerably antedated the development of pallets and their handling devices. Skids, of which Fig. 1 is one type, are platforms elevated about a foot or slightly less above the floor. Instead of a platform, the elevating feet may be attached to a box in which loose materials can be placed. Pallets, however, are much lower, a considerable advantage in saving headroom when loads are to be stacked in storage or shipment. Another advantage possessed by pallets of all kinds (with the exception of the single-faced variety shown in Figs. 2 and 6) is that little or no dunnage is required in stacking. The same may be said of certain special varieties of skid incorporating a box, bin or rack. With platform skids, however, pieces of dunnage must usually be put on the top of each load if another load is to be placed on it. Pallets are generally much lighter, an advantage in shipment, especially when they must be returned. Space saving is also an important factor.

Double-faced pallets are used much more commonly than the single-faced variety of Fig. 2. The double-faced type is made in three general designs, permitting entry of the forks from two sides, four sides, or from four sides plus the four corners (the so-called eight-way pallet). Two-way pallets suffice for most purposes, the four- and eight-way being particularly useful when the loads must be maneuvered in close quarters. Fig. 3 shows a common design of lumber two-way pallet having the bottom boards spaced to accommodate the wheels of a hand pallet truck. This type or some variation of it is essential when hand trucks must be used and, of course, works equally well with fork trucks. Fig. 4 shows a special two-way pallet (the stevedore type) used for ocean shipments because the overhung ends of the decks permit the entry of the sling bars used in ship loading.

Other pallet designs are shown in Figs. 5 to 11. In Fig. 5 is a demonstration of how easily pallets can be stored when not in use. The same fork truck that handles palletized loads readily stacks the empties to the ceiling. Fig. 6 shows one design of commercially available fiber-board pallet supporting a load of over 5,000 lb. of brick on 8 sq. ft. of pallet surface. This pallet, impregnated to give it sufficient strength, is manufactured by the Laminite Products Division of Old King Cole, Inc., Canton, Ohio. Several other manufacturers have pallets of similar construction under development while the maker of the design of Fig. 6 also produces a double-faced design. A standard 48 x 48-in. paper pallet is said to handle 3,500 lb. in shipment or 10,000 lb. in storage. It is claimed that the price is low enough to permit discarding the pallet at its destination, thus avoiding the cost of returning to the shipping point.

A simple design of four-way pallet, which can be entered from any side to facilitate maneuvering, appears in Fig. 7. Hardly more complicated are some of the designs of eight-way pallet worked out at the Naval Ordnance Materials Handling Laboratory. Three of the many types developed at the Laboratory appear in Figs. 8 to 11. One of the simplest and most satisfactory wood pallet types is shown in top and bottom views in Figs. 8 and 9. Bottom views of two others, one with a wood slat top and metal-bound plywood bottom; the other of light but extremely strong metal and wire construction, appear in Figs. 10 and 11.

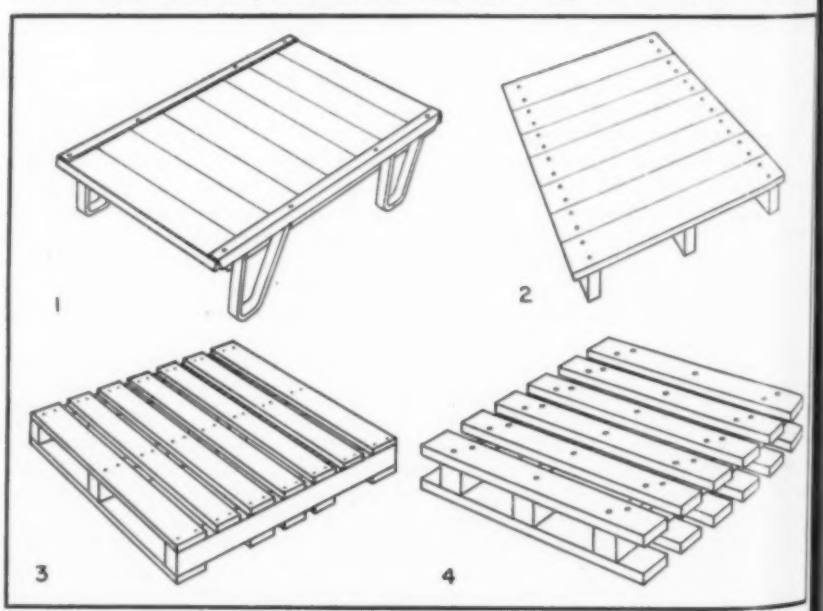
Maximum use of pallets for shipments in the future calls for the solution of certain problems, especially those in two categories. One is the cost of pallet return, the other the problem of pallet standardization. The expendable paper pallet, already mentioned, is one effort in the direction of reducing over-all handling cost of pallets. Another is a trend already noted in connection with certain sorts of shipping cases and crates to build in pallets or projections that allow the entry of forks. Perhaps the most satisfactory all-around solution will come from plans that are being discussed for the establishment of pallet pools in principal industrial cities. This of course will require standardization on a few suitable sizes. Probably it will not be possible to reduce the standards to the two used by Naval Ordnance: 48 x 48 in., and 35 x 45½ in., but a small number should be possible. The 48 x 48-in. pallet is ideal for many purposes, especially since two pallets can be placed side by side and nearly fill the width of a freight car. However, two such pallets cannot be placed side by side in a practicable width of automobile truck, so that narrower pallets must be used for such purposes if the truck space is to be used economically.

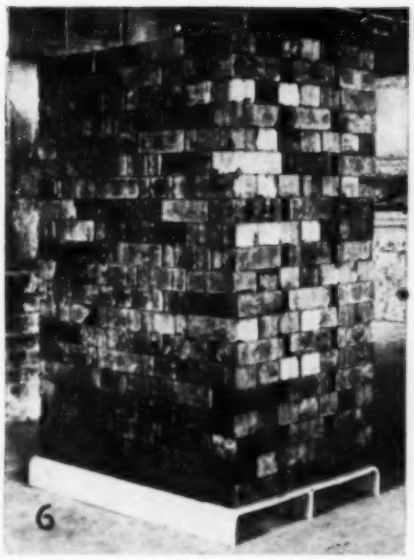
HANDLING EQUIPMENT

When the skid was first developed its sole purpose was to enable a load to be picked up and transported. The idea of its being elevated for stacking came somewhat later. In the initial stage the hand lift truck and the power-operated low-lift platform truck were the only types of skid handling equipment available although the tiering or high-lift platform truck followed shortly thereafter. At present such trucks are produced in both telescopic and non-telescopic designs, for both high and medium lifts. There are also two recent developments in skid-handling equipment: the wheel-and-tongue combination ("jack-lift") used with semi-live skids having feet at one end and wheels at the other, and the electric-powered Transporter made by Automatic Equipment Co., a truck similar to a hand truck in that it has a foot-operated hydraulic lift and is guided by means of a tongue by a worker walking ahead; but differing from other hand trucks in that its propulsion, forward or reverse, is provided by electric power from a storage battery. More maneuverable than electric trucks that carry the operator, the Transporter has been used extensively where the work is not sufficient to justify a larger piece of equipment, and particularly where loading is in close quarters.

After the advantages of skid handling had been demonstrated, it became apparent that still further advantage would come from a handling method consuming less unproductive headroom. An early expedient was to attach forks to the end of the

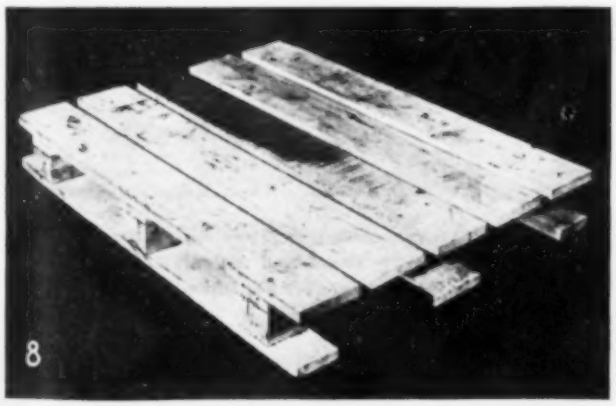
Several common varieties of pallets and a skid, including: (1) A steel-bound wooden skid; (2) a single-faced pallet; (3) a two-way, double-faced pallet with bottom openings for hand truck wheels; and (4) a stevedore pallet for lifting aboard ship with a cargo sling (Drawings from Yale & Towne)

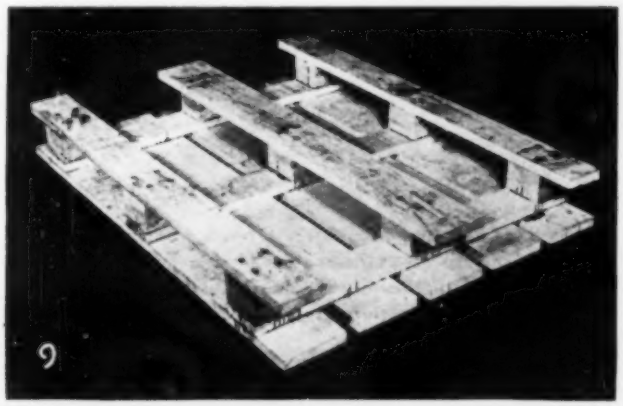


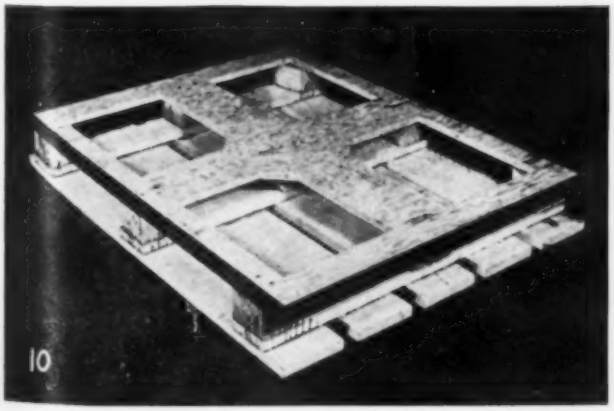


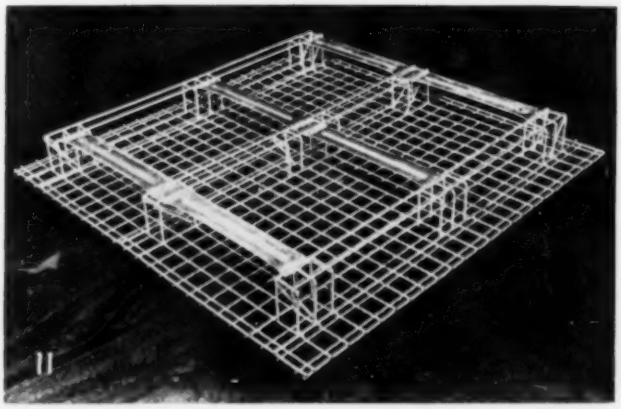
VARIATIONS OF THE PALLET IDEA

Almost as versatile as the truck that handles them, pallets are made in many designs in wood and plywood, fiber-board, sheet metal, wire, and combinations of these materials. Pallets for two-way, four-way and eight-way entry are shown here. A present problem is standardization to reduce the number of sizes in use. Another important problem is to reduce or eliminate the cost of pallet returns to the point of origin. Expendable pallets and pallet pools are solutions now under consideration. If these work out, pallet use will increase tremendously. Shown here are a variety of pallets including: (5) Elwell-Parker truck stacking piles of plain double-faced pallets; (6) single-faced fiber-board pallet developed by Laminite Products Div., Old King Cole, Inc., supporting 5,100 lb. on 8 sq. ft.; (7) Clark truck elevating bundles on a simple four-way pallet at an Army depot; (8) and (9) top and bottom views of a successful wood eight-way pallet; (10) and (11) bottom views of a wood and plywood eight-way pallet, and a light-gage wire pallet. Figs. 8-11 are developments of the Naval Ordnance Materials Handling Laboratory, supplied by *The Palletizer*, the Laboratory's monthly publication





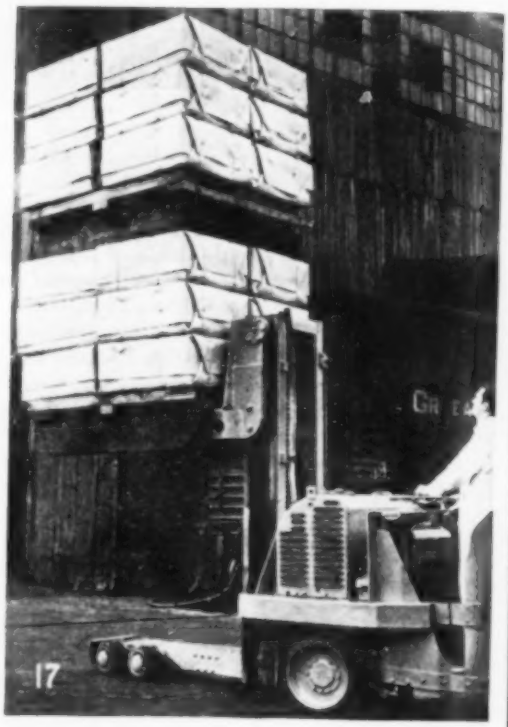




EQUIPMENT USED FOR SKID AND PALLET MOVEMENT

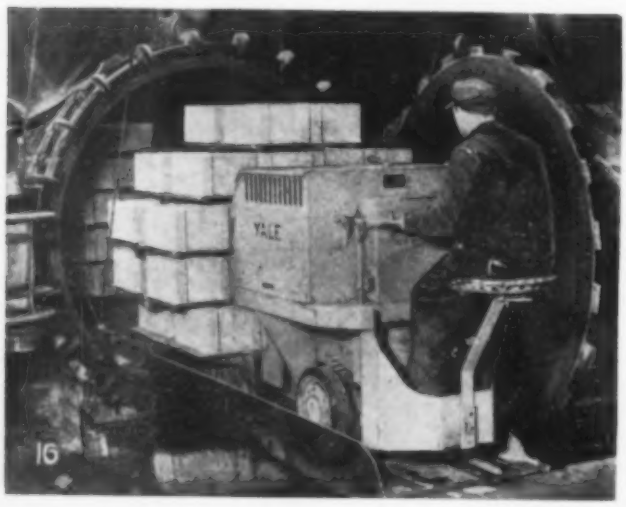
Hand and power trucks are both indispensable in the movement of skids and pallets. The two fundamental types are the platform truck and the fork truck. Although power operated trucks are made in both low and high lift types, hand trucks cannot tier unless combined with an elevator as in a stacker. On this page Figs. 13, 14 and 17 were supplied by *The Palletizer*

(13) When stacking is not needed (see Fig. 20) this Yale hand truck handles heavy loads of carboys on pallets; (14) however, to reduce manual labor the Automatic Transporter shown here loading ammunition "tanks" on pallets into a freight car, is widely used in both pallet and platform types; (17) high lift platform trucks, such as this one made by Yale, handle heavy loads to considerable heights, yet are lighter than comparable fork trucks



(16) This Yale low lift platform truck is carrying building blocks into an autoclave for curing; supporting the load on skids, the low headroom of the equipment makes an application of this type possible

(18) Fork trucks ordinarily steer only from the rear wheels. This newly developed articulated truck, made by Baker, is more maneuverable than a standard truck and is said to require 2 ft. less aisle width



platform of an ordinary high lift platform truck. A logical step then was to eliminate the platform and with it the extension ahead of the elevating mechanism, on which the front wheels were mounted. The result was the fork or pallet truck which has forged ahead so spectacularly in recent years that the impression sometimes prevails that the platform truck is doomed, and with it the skid. Despite the much greater versatility of the fork truck, this is not correct. Although fork trucks can come closer to the load; although they can turn in shorter radius for a given wheel base; although they can stack higher owing to the use of pallets rather than skids, and generally eliminate the use of dunnage in stacking, they have certain disadvantages. Because a fork truck has no outboard wheels under the load, as has a platform truck, it must be counterbalanced to give it stability. This means that for a given load a fork truck is always heavier than a platform truck. Also it is more expensive. For example, an average fork truck for 2 tons capacity will weigh about 4 tons unloaded, while the comparable figure for a platform truck will be about 2 tons. For larger trucks comparable approximate data are: 3-ton trucks, 5 and 2½ tons; 5-ton trucks, 6 and 2¾ tons. Where building construction will not permit the high weight concentration in the front wheels of a fork truck, a platform truck must sometimes be chosen despite other factors.

As in the case of skid trucks, pallet trucks also are available in manually operated types. In this case, however, the forks must be provided with wheels at the outboard ends to avoid the counterbalancing needed in powered trucks. It is for this reason that openings must be left in the bottom of a double-faced pallet that is to be lifted by a hand truck. The Transporter, previously mentioned as a skid truck, is also built for pallet handling, and has been applied to a large extent in war-time car loading and handling within military depots and industrial plants.

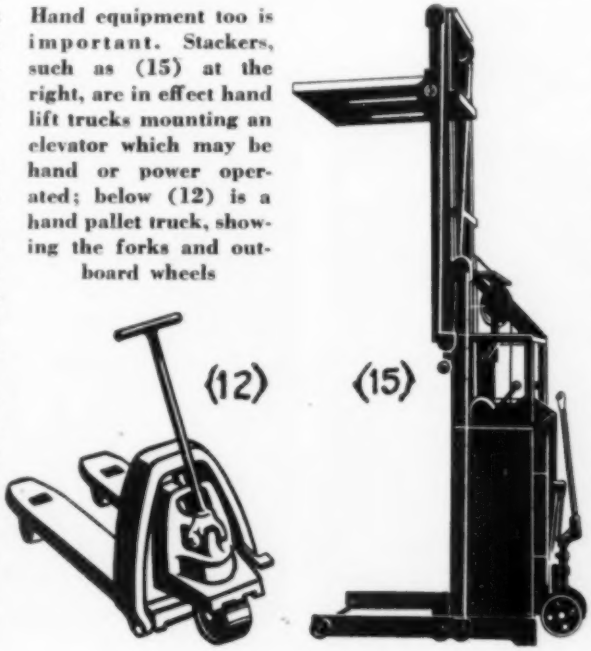
One more type of equipment of this general class should be noted: the portable elevator. Moved from point to point by hand, such equipment may elevate either by hand or electric power, and may be of either telescopic or non-telescopic design. The elevator is to the hand lift truck as the high lift platform truck (which it resembles more closely than it does the fork truck) is to the low lift platform truck. In some designs only skid loads or loads stacked directly on the elevator can be handled, in other pallets can be accommodated.

To summarize equipment types, Fig. 12 portrays a well known variety of hand pallet truck while Fig. 13 shows the same type in use handling carboys on pallets. Fig. 14 illustrates the use of a pallet Transporter in loading a freight car, while Fig. 15 shows one form of powered-hoist, hand-transported stacker. Figs. 16 to 18 show power operated trucks: a low lift platform truck in Fig. 16, a high-lift platform truck in Fig. 17, and a fork truck in Fig. 18. The last is noteworthy for a new type of construction originated and used only by this manufacturer: articulation of the front wheels and fork end. Maneuverability is increased as compared with standard fork trucks, and it is claimed that aisles about 2 ft. narrower than the 12-ft. aisles usually required can be employed on this account.

Truck performance varies considerably with type and capacity. Fork trucks generally tier higher than platform trucks and usually the greatest heights are not available in heavier models. Most fork trucks are telescopic, while high-lift platform trucks are both telescopic and non-telescopic. A tiering height of about 12 ft. is usually the greatest available in a fork truck, although sometimes it is possible to gain greater height by reversing the forks. Also, except with heavy loads, it is common practice to stack one load on another, then lift the combined loads for the highest row in a storage area.

One characteristic of fork trucks that increases maneuverability compared with platform trucks, in addition to improving the riding ability of the load, is the tilt of the elevating mast. Commonly the forks can be tipped forward about 5 deg., or backward about 10 deg., the latter for carrying and maneuvering in tight spots.

Hand equipment too is important. Stackers, such as (15) at the right, are in effect hand lift trucks mounting an elevator which may be hand or power operated; below (12) is a hand pallet truck, showing the forks and outboard wheels



TRUCK APPLICATION

Typical applications of fork and platform trucks are shown in the views of Figs. 19 to 28. It will be noted that these illustrate "storage" rather than "shipping" applications, since the loads in each case are simply stacked on the pallets or skids, without fastening. The make-up of unit loads for shipment will be discussed at another point. The illustrations make it evident that objects of almost any character, provided that they resemble "boxes, bales, bundles, bags or barrels," can be handled expeditiously and with a minimum of rehandling in this fashion. For boxes, bundles, bags and brick, it will be noted from figures such as 19, 21, 22 and 23, that interlocking of the load is essential for stability. A useful trick in carboy handling is shown in Fig. 20, where a wooden "collar" laid on each row permits another to be placed on it when tiering is desired.

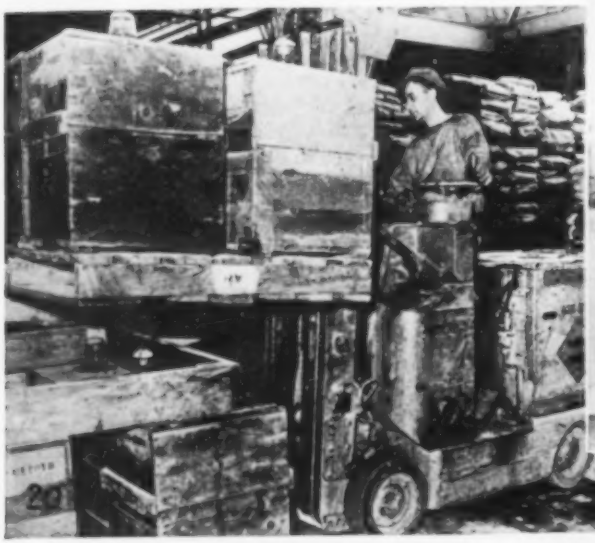
That fork trucks readily handle cylindrical objects ranging from barrels and 55-gal. steel drums, through small fiber shipping drums for chemicals, to rolls of paper, is evident from Figs. 24-28. An interesting point in respect to drum handling is the variety of ways in which a drum can be picked up. With the fork width adjusted to clear the drum but not the rolling rings, a drum can be suspended vertically from one of the rings on the forks and loaded on to a pallet which itself can be picked up. Or a single drum can be picked up in horizontal position either end-wise, as in Fig. 27 (to empty its contents into a process vessel) or side-wise, for depositing on a drum rack. Often it is possible to pick up other objects than drums without damage directly from the floor. Fig. 28 shows a paper roll so handled by chiseling the forks under the roll.

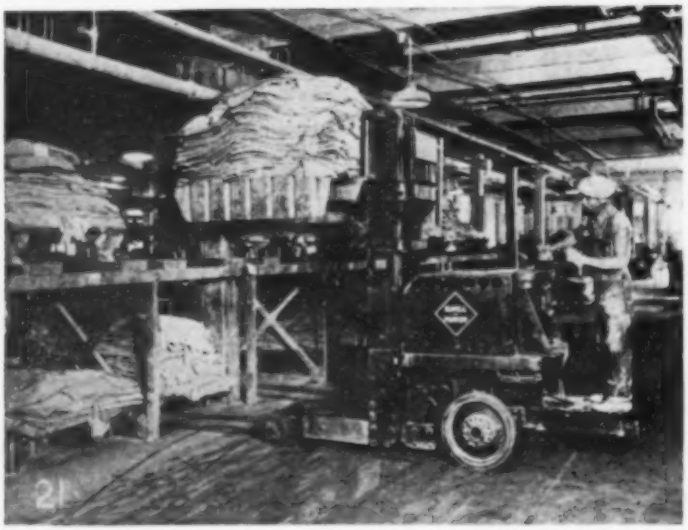
UNIT LOADS

One of the great lessons of wartime supply was that, through pallet shipment, expensive packaging can often be almost, or even entirely, eliminated. Many startling examples can be found in the case of military materiel. Fig. 29 shows an example from the Naval Ordnance Materials Handling Laboratory where development of a special pallet and cover for 5-in. anti-aircraft shells eliminated individual boxing, saving much space as well as packaging cost. A similar industrial example is the General Electric unit load of large insulators appearing in Fig. 30. Several other examples from the Materials Handling Laboratory are portrayed in Figs. 31 to 34. In Fig. 31 live ammunition "tanks" are being made into a horizontal unit load with the aid of wooden "jigs" to support the cylinders before the steel strapping is applied. In some cases "tanks" are loaded vertically, as in Fig. 32. Where more protection is needed, as in the case of the rocket motors in Fig. 33, a special "package" for the entire pallet load provides the

INDUSTRIAL TRUCKS HANDLE BOXES, BUNDLES, BRICKS AND BAGS

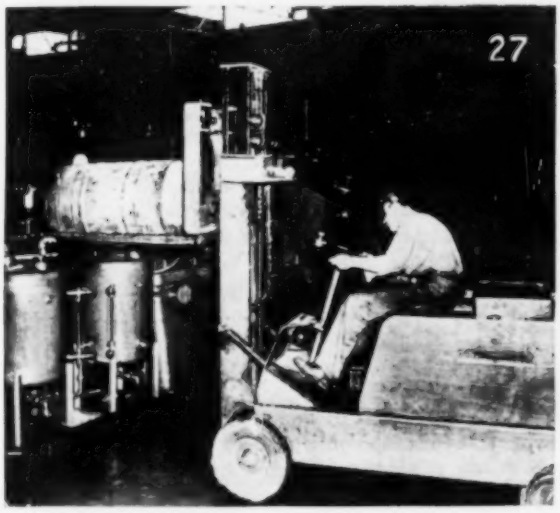
Presented on this and the opposite page are a group of illustrations showing the versatility of fork and platform power trucks in what might be called their normal applications, as distinguished from the group of special uses shown on pages 128 and 129. On this page are cases where non-cylindrical objects are handled: (19) One of the best pallet loads is constructed from rectangular boxes interlocked for stability as shown by this Automatic fork truck load; (20) here an Elwell-Parker truck is tiering carboys on pallets through the trick of interposing a wooden "collar" between layers; (21) one method of stacking with this Elwell-Parker platform truck is illustrated here, showing rubber on skids being stacked with the assistance of racks; (22) brick too, because it can be interlocked, makes a firm pallet load. A Baker fork truck is being used; (23) this Mercury truck is stacking interlocked bags to a height of four pallet loads. If bags are stacked on skids, a considerable quantity of dunnage must be used. Similar treatment can be accorded bundled materials

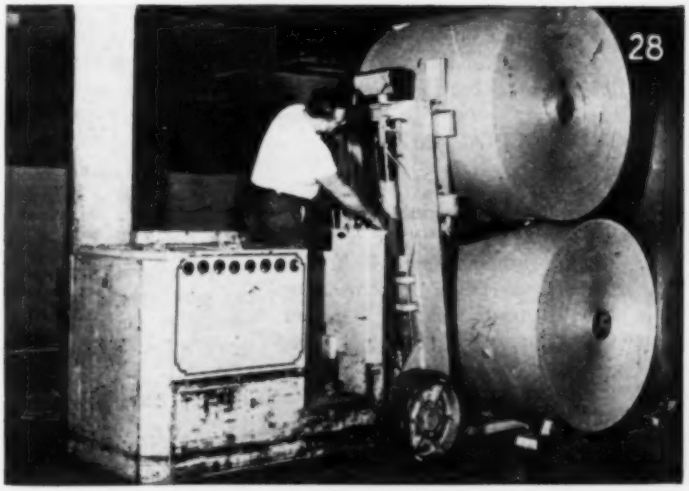




CYLINDERS ARE HANDLED EASILY WITH FORK TRUCKS

Cylindrical objects of many kinds can be stored and transported on pallets and skids, and sometimes handled directly by the truck forks, as shown in two of these views. For shipment, however, some method of unitizing the load (for examples, see page 127) must be used unless the objects are individually stowed and braced in the carrier. The illustrations here are typical: (24) This Towmotor truck carries pallet loads of heavy wooden barrels, containing sodium nitrite, stacking the pallets two high; (25) these 55-gal. oil drums are an easy load for the Towmotor which piles them up six high; (26) small fiber drums of chemicals also lend themselves well to palletizing. The Mercury truck is handling 24 drums per pallet and lifting three pallets simultaneously; (27) here a Towmotor truck has forked a horizontal drum and is emptying it into a process vessel, only one of several possible evolutions with drums; (28) this Mercury truck has lifted a roll of paper directly from the floor, by inserting the forks chisel fashion under the load





answer. Even heavy cylindrical objects, such as compressed gas cylinders, can be made up into satisfactory unit loads, as in Fig. 34. This is only one of several methods with which the Navy has experimented. In storage, for example, simple cleated dunnage strips can be laid between the rows.

A spectacular example of package simplification was the use by the Brooklyn Naval Clothing Depot of only five different sizes of carton for shipment of such items as clothing. First there are three sizes, the standard, half-standard and quarter-standard, which respectively can be stacked 18, 36 and 72 on a standard 48 x 48-in. pallet. For export a large box which can be stacked five to the pallet is used to hold three standards or a proportionate number of half- or quarter-standards. Finally, for certain domestic purposes a bulk package is used, requiring four to the pallet. All types make up to 48-in. cube pallet loads which are capped with a pallet cover of fiber-board and then steel strapped to a strong and reliable unit load. So important did the Navy consider package standardization that suppliers were required to fit their products to the package, rather than the opposite, usual method. If it was sometimes necessary on this account to fill a package incompletely, that was tolerated for the sake of standardization.

Recent experimentation is pointing the way to still another method of making a unit load, without the need for strapping. Research has been conducted both industrially and in the services, and considerable success has been attained with cartons and in some cases, paper bags. The method consists in gluing the various units of the load to each other, at top and bottom only, using an adhesive that is strong in shear, but permits ready separation of the units by a sharp upward yank on one edge. Industrially most of the work appears to have been carried out by National Adhesives and National Distillers. The load may be glued directly to chipboard on the car floor, a practice which reduced breakage of case goods in transit almost to the vanishing point in several experimental cars shipped by National Distillers. When shipment is on pallets there have been suggestions of gluing directly to the pallet, but the favored method seems to be to glue to chipboard tacked to the pallet.

TRUCK ATTACHMENTS

Already versatile, special attachments are available in great profusion to make fork and platform trucks capable of many other activities than those for which their normal design suits them. In some cases these are attachments that can be added to an ordinary truck without any change; in others, they consist in special-purpose containers adapted to platform or fork handling; in still others, the attachment involves some modification of the truck. For example, simple extensions can be added to standard forks to increase their length, while extension back rests for high loads are supplied by most manufacturers. With the forks removed a crane arm can be added, or a ram, as shown in Fig. 41.

A group of special container applications is shown in Figs. 35 to 40. For example, a scale-equipped platform truck can handle special batch hoppers for assembling and transporting glass batch ingredients, as in Fig. 35. Fig. 38 shows similar but smaller hoppers which can be stacked and transported by an ordinary fork truck. Extruded clay parts are readily handled into the dryer on a rack such as that shown on a platform truck in Fig. 36. One white lead manufacturer uses a high lift fork truck and a special box in charging his corroding stacks with pots containing lead buckles and acetic acid, as in Fig. 37. A simple means of lifting various loads with a fork truck is illustrated in Fig. 39, while Fig. 40 shows how light materials can be dug and transported with a special scoop that slips over the forks.

Among special attachments the ram used for coiled stock in the metal industries, shown in Fig. 41, is one of the most common. An unusual type of fork with inward projections that fit under the ears on pigs of lead can be used to eliminate pallets in lead handling, as in Fig. 42. Elwell-Parker, in cooperation with Allis-Chalmers, worked out the novel means of storing, transporting and dumping illustrated in Fig. 43. This combines a special container having channels welded on the bottom, and stacking lugs on the top, with a rotating mechanism for the truck forks. Although applied for the gathering, storing and dumping of metal waste, the method should be equally applicable for handling any solid material that must be charged into equipment in small batches.

An extremely novel device used in the brick industry, the Priester brick fork made by the Bradney Machine Co., appears in Fig. 44. Here no pallets are required since the bottom rows of brick are gripped by projections on the special fork tines, automatically engaging the brick as the fork is lifted for carrying. The bottom rows, arranged to admit the six tines, then serve to support the rest of the load. Spotting is facilitated by a hydraulic fork shifter permitting a few inches of side movement.

Still other truck modifications appear in Figs. 45 and 46. Scoop trucks that dig, carry, elevate and dump are commonly used for handling bulk fertilizers and similar materials. Peculiar to the paper industry, the paper roll truck of Fig. 46 makes use of a special rotatable scoop that can pick up a paper roll from either the vertical or horizontal position, and lay it down either vertical or horizontal.

STOWING AND SHIPPING

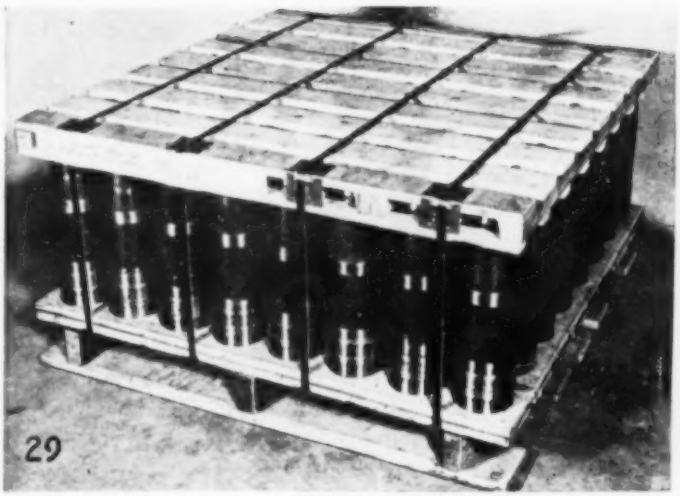
Although power operated trucks require more working space than hand trucks, their speed in handling materials and their ability to stack to considerable heights (and so put most of the cubage of a given space to work) usually more than offset the increase in aisle area. The average 4,000-lb. fork truck requires a 12-ft. aisle. Using 45-deg. diagonal stowage it has been pointed out in *The Palletizer* that a 7-ft. aisle will suffice. Thus it would appear that considerable space is saved. Actually, however, there is no saving since enough floor area is wasted around the walls to offset the aisle saving. Nevertheless, *The Palletizer* finds that diagonal stowage (usually at 45 deg.) is sometimes worth while in areas badly cut up with building columns, or where pallets of rectangular shape are used, provided the opening is in the narrow side. Also, in a full warehouse, several extra pallets can be stowed diagonally at one side of a normal aisle if their corners are 2 ft. apart to permit swinging.

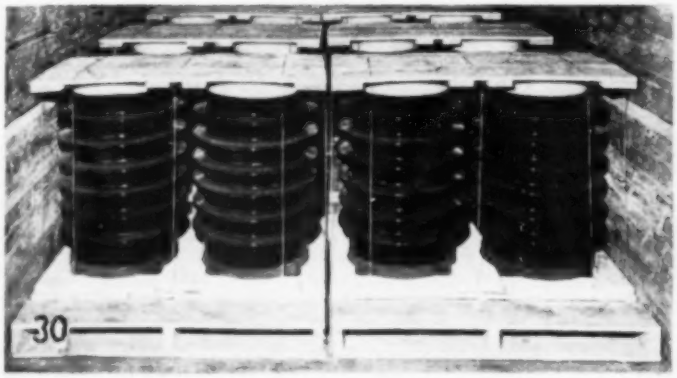
COMBINATION HANDLING

When pallets are to be loaded for shipment, as in automobile trucks, cars or ships, it is generally recognized that fork and platform trucks should be used only for transport over relatively short distances to the carrier. Commonly, if the distance much exceeds the economical one, intermediate use is made of tractors and trailers which are intended for such service. A fork truck, for example, can readily load a trailer at one point, and unload it at another. A modification of this idea found in some plants is to use trailers for gathering from producing departments, while final handling for storage and shipping is by fork trucks. Fig. 47 shows how a paint manufacturer employs this system. Packages from a conveyor are transferred to a pallet on a trailer, which is then towed either by a tractor or by an overhead chain system. At the storage point (Fig. 48) the pallets are removed by a fork truck for tiering and movement to shipping.

Movement to the shipping carrier and stowage within the latter are problems that are often handled with fork and platform trucks. Such trucks are generally capable of entering a freight car as in Fig. 49, where the load may either be removed from the pallet and stowed, or where pallet and load can be set down or stacked together. When unit loads are employed, speed is the rule. One example cited by *The Palletizer* told of a recent case where one man with a fork truck unloaded a box car of 5-in. inert projectiles in 27 minutes. If the space that must be left by a fork truck within the car should be filled to bring the car up to weight, the last pallets can be placed by hand truck. A hand truck is invaluable also when there is no loading dock, as shown by the Materials Handling Laboratory's scale models portrayed in Fig. 50. Here the fork truck first

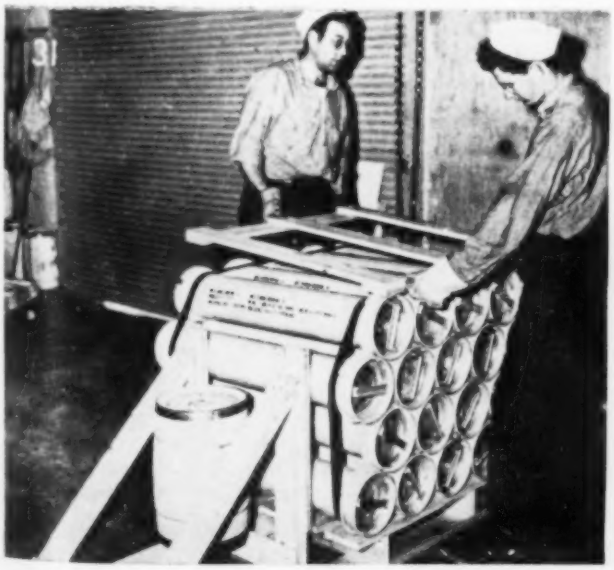
(*Text continues on page 130*)

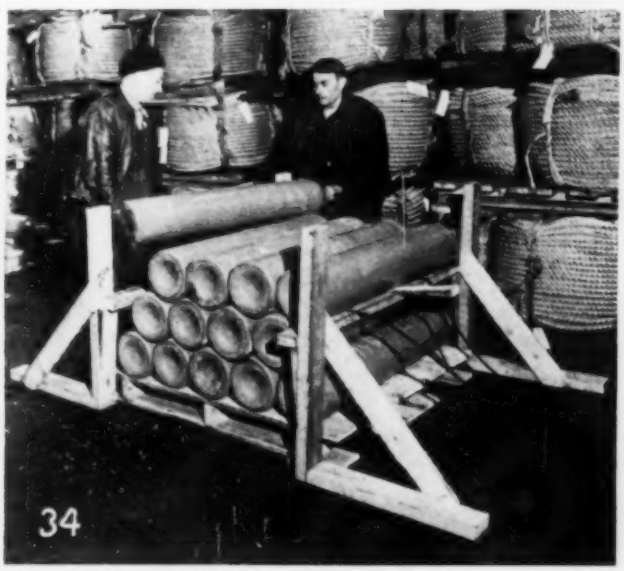


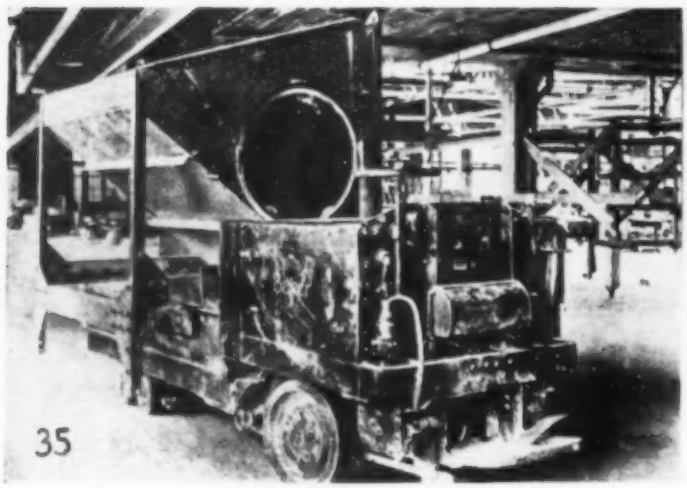


UNIT LOADS INSURE SAFE SHIPMENT

These views, all from *The Palletizer*, represent with the exception of Fig. 30 a few of the many unit loads developed at the Naval Ordnance Materials Handling Laboratory: (29) This unit load of 5-in. anti-aircraft shells replaced former practice of individual boxing; (30) somewhat similar to Fig 29 is the G. E. method of palletizing large insulators for shipment without other protection; (31) tanks of live ammunition are readily stacked and strapped into unit loads in this fashion; (32) another type of tank unit load; (33) extra protection is thus afforded for small cylinders; (34) here compressed gas cylinders are unitized



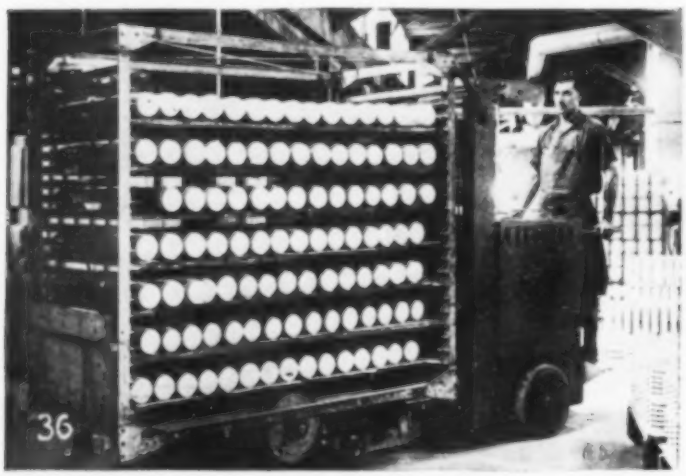


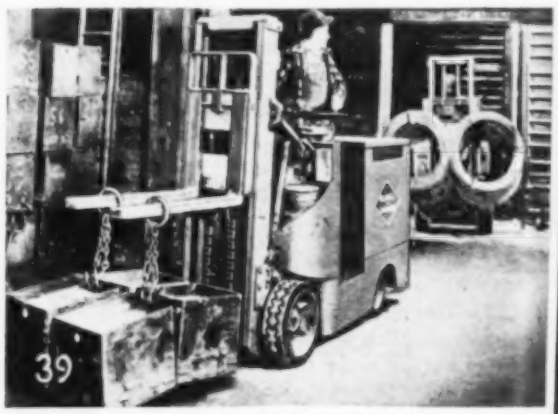


USING SPECIAL CONTAINERS

Much ingenuity has gone into the development of special containers that extend the normal range of platform and fork truck uses: (35) Above is shown a removable glass batch hopper carried on a Baker low lift platform truck equipped with a scale for making up the batch by weight. The same idea has many other possible applications

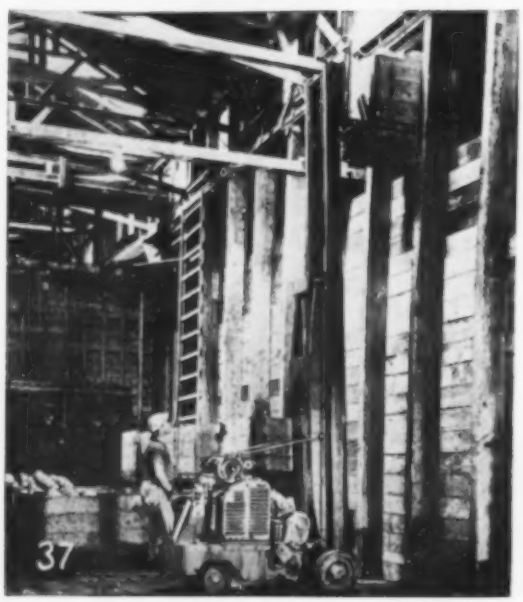
(38) Above, a Towmotor truck is shown handling special stackable batch hoppers with bottom outlet gates; (39) below Baker trucks demonstrate two methods whereby loads can be suspended from the forks without having to "get under"

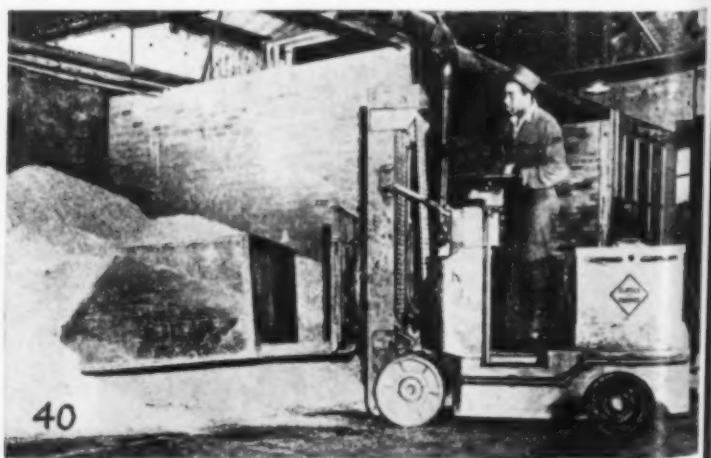


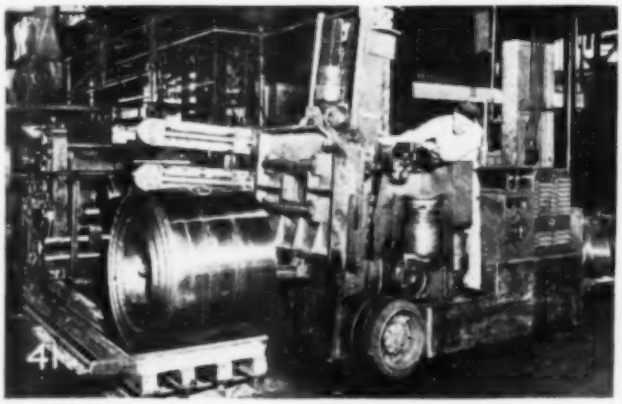


(36) At left is an ingenious rack for extruded clay, carried into the dryer on a Mercury truck

(37) Left view shows a Baker fork truck handling a special box for charging the corroding stacks in the Dutch process of white lead manufacture; (40) Below is a special digging hopper carried on the forks of an Elwell-Parker truck which can scoop up, transport and dump a variety of light materials







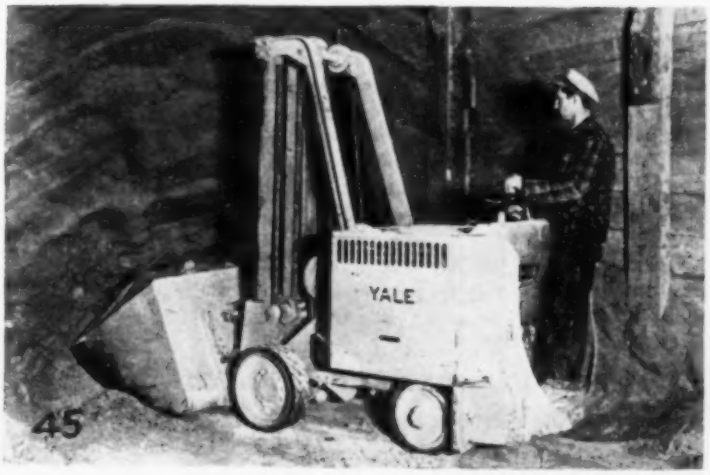
MANY JOBS CAN BE DONE WITH SPECIAL TRUCKS

Special trucks or attachments greatly extend the field for fork truck use. For example (41) the Elwell-Parker ram truck above is a variation widely used in the metal industries for transporting many kinds of coiled stock

(42) At left, this special type of fork developed by Baker lifts lead pigs, transports and stacks them without a pallet; (43) cooperative effort between Allis-Chalmers and Elwell-Parker resulted in the development of this method of storing, carrying and dumping of any kind of bulk material

(44) One of the most novel attachments is the Priester brick fork which grips the bottom bricks and needs no pallet

(45) Many jobs requiring digging, carrying and dumping of bulk materials can be handled with this Yale scoop truck



(46) This Towmotor paper roll truck substitutes a rotating scoop of special design for the usual forks, for handling rolls either horizontally or vertically

Fork and platform trucks are often used in combination with other sorts of handling equipment, such as trailers

In (47) packages are stacked from the conveyor on a trailer which is later unloaded by a fork truck (48)

lifts the Transporter into the car, then feeds pallets to it.

Loading pallets into automobile trucks sometimes presents problems. If a loading dock is available, a hand truck can be used. If not the method illustrated in Fig. 51 is effective when the truck sides are not removable. Here the fork or platform truck feeds a couple of sections of gravity roller conveyor placed on the truck bed. If the truck sides are removable stowage is simple, of course.

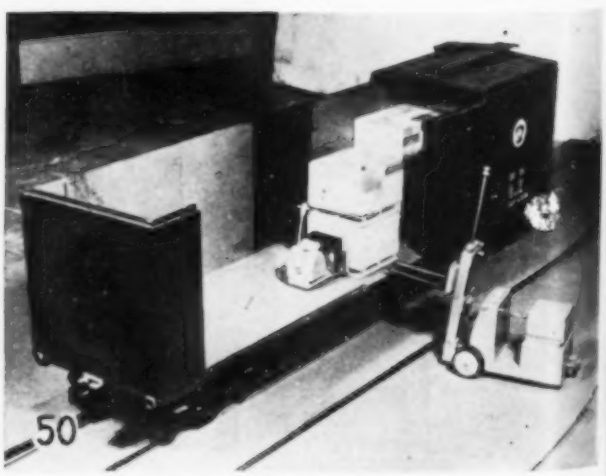
In so brief an article it has been possible to mention only a few of the tricks of the trade of materials handling on skids and pallets. Suffice it to say that there are many more, and the possibilities for these methods are almost endless.

In conclusion, the editors wish to acknowledge the assistance of many individuals and organizations, including the Naval Ordnance Materials Handling Laboratory, the Electric Industrial Truck Association, the Philadelphia Division and Automatic Transportation Division of the Yale & Towne Mfg. Co., the Mercury Mfg. Co., the Clark Tructractor Division of Clark Equipment Co., the Towmotor Co., Elwell-Parker Electric Co., the Baker Industrial Truck Division of Baker-Raulang Co., the Bradney Machine Co., Old King Cole, Inc., and Robert Gair Co.

Reprints of this report are available at 25 cents per copy. Address the Editorial Department, *Chem. & Met.*, 330 West 42nd St., New York 18, N. Y.

LOADING METHODS DEMONSTRATED

Both fork and platform trucks can easily enter freight cars to stow their loads, as shown by the Elwell-Parker truck in (49); in loading automobile trucks without a loading dock, the roller conveyor in (51) permits easy stowage while the same problem with a freight car can be solved as in (50) by feeding a Transporter or other hand truck from a fork truck (Figs. 50 and 51 from *The Palletizer*)



PROCESS EQUIPMENT NEWS

THEODORE R. OLIVE, Associate Editor

CONVERTIBLE FLOOR TRUCK

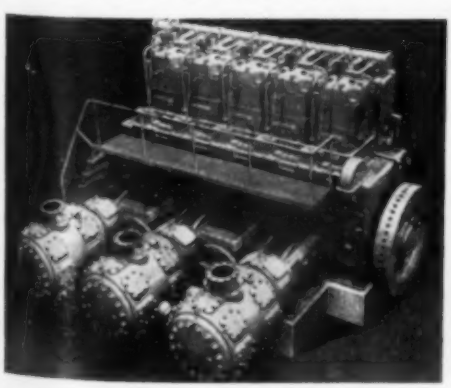
ONE BASIC floor truck unit, to which accessories can be added to make various kinds of floor trucks, has been announced by Market Forge Co., Garvey St., Everett 49, Mass. As shown in the accompanying illustration the basic truck, equipped with deep stake pockets at each corner, is readily converted to a leaf truck, shelf truck, rod and tube truck or any one of the other varieties shown, as well as many other combinations to suit specific needs. Furthermore, the running gear is also convertible, employing various combinations of 6-in. caster wheels and/or 12-in. bull wheels mounted on roller bearings and hardened shafts. Thus non-tilt and tilt types, dolly types, wagon types, six wheelers and other arrangements can be provided. The basic unit includes a strong steel chassis capable of carrying up to 5,000 lb., but it is claimed that through careful design weight is minimized.

GAS ENGINE COMPRESSOR

THREE SIZES, five-cylinder, six-cylinder, and eight-cylinder, for 1,000, 1,200 and 1,600 hp., respectively, are available in the new line of two-cycle BA 17 gas-engine-driven compressors announced by Clark Bros. Co., Olean, N. Y. The new design is said to double the power previously developed by right-angle, gas-engine-driven compressors. The machines employ a 17-in. bore and 17-in. stroke, giving 200 b.hp. per cylinder. In consideration of the power developed, the new compressors are said to be surprisingly simple and compact. Unsightly passages for the scavenging air are eliminated from the upper surface of the engine. For ease of operation, centralized control has been achieved by grouping the air starting lever, fuel gas valve, governor and exhaust pyrometers all at one station. An over-all length of 17 ft. 6¾ in. is required for the five-cylinder, 1,000-hp. model; and 25 ft. 6¾ in. for the eight-cylinder, 1,600-hp. model.

Convertible floor truck

1,000-hp. gas-engine-driven compressor



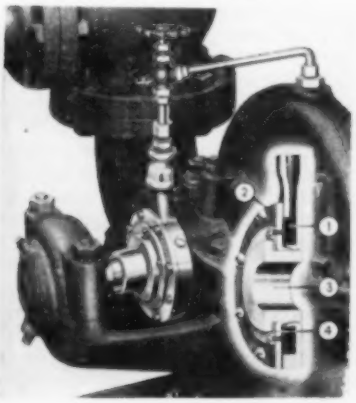
INFRA-RED UNIT

TWO NEW portable infra-red units of six and twelve-lamp size, for use with reflector type R-40 or RF-40 infra-red drying lamps, have been announced by Carbomatic Corp., 1775 Broadway, New York 19, N. Y. The lamps may be of 125-watt, 250-watt or 375-watt size. Each unit consists of a floor stand supporting the lamp assembly, so arranged that the heat may be directed from any height and angle.

SHAFT SEAL

NOVEL application of the jet principle to a pump seal is found in the new Jet Shaft Seal manufactured by Jet Shaft Seals, Inc., 1452 South San Pedro St., Los Angeles 15, Calif. The device is said to provide a leak-proof seal both while the pump is in operation and when it is idle. For application on horizontal centrifugal pumping units the device is claimed by the manufacturers to save a large percentage of pump maintenance costs by eliminating waste of fluid, packing expense and the causes of sleeve and shaft wear. The seal draws pressure from the high pressure point of the pump and directs it back into the low pressure area of the pump with sufficient force to seal off internal pressures. In the illustration the liquid flows through (1) the liquid box, inward past (2), the orifice plate, and back into the pump. Shaft sleeve (3) turns with the shaft, but is not in contact with the orifice plate so there is no point of wear. Diaphragm (4) provides a leak-proof seal while the pump is out of operation, being forced outward by the pressure within the pump against the shoulder of the shaft sleeve. During operation it is not in contact. Such seals are available in both bronze and stainless steel for all sizes of pumps of 1 in. shaft size and over.

Jet type shaft seal



SPOUT MAGNET SEPARATOR

SPOUT widths from 8 to 24 in. can be fitted with standard sizes of a new permanent-magnet spout type PM separator recently announced by the Stearns Magnetic Mfg. Company, Milwaukee 4, Wis. The principal feature of this new device is the automatic discharge of tramp iron which eliminates any manual cleaning. When the magnet is lowered, the accumulated tramp iron falls through a gate which operates in conjunction with the magnet release. Thus, when the magnet is returned to operating position, the gate is closed and the flow of material resumed. The magnet mechanism can be controlled from near or remote positions and may be installed in places difficult of easy access, still permitting automatic cleaning. Other features include positive opening and closing of the trap gate mechanism for discharging tramp iron; a powerful double-gap magnetic field without use of outside electrical energy; and simple design with a minimum of complicated parts.

COMBINATION NOZZLE

TO PROVIDE plant or professional firefighters with a nozzle capable of applying water to a fire in the form best suited for the particular kind of fire encountered, especially in oils and other flammable liquids, Grinnell Co., Providence 1, R. I., has developed the Flamebuster three-purpose fire hose nozzle. The operator, by shifting the valve handle, has at his disposal either a spray or a solid stream. A choice may be made between a high and low velocity spray by attaching the proper tip to the nozzle by means of a simple bayonet-type catch.

For extinguishing stubborn fires in light, flammable liquids, the low velocity spray tip on a 4-ft. or 10-ft. applicator discharges a wide angle cone of evenly distributed fine spray directly over the blaze. The fire is claimed to be extinguished quickly with minimum water consumption. For extinguishing fires in heavier oils, a driving spray from the high velocity tip is said to emulsify the blazing oil and render

Flexible stainless steel hose

it incapable of burning. The spray also furnishes the fireman excellent protection in approaching the blaze. Finally, for mopping-up operations on wood or similar materials, ignited by oil fires and burning beyond the range of the spray, the nozzle may immediately be shifted to a solid stream. Large orifices are employed in the spray tip to prevent clogging.

STAINLESS HOSE

Flexible stainless steel hose is now being produced, according to the Carpenter Steel Co., Welded Alloy Tube Division, Kenilworth, N. J., for applications where flexible connections are required between moving parts, or where vibration must be eliminated between two rigidly held units. This tubing, manufactured from stainless steel of various analyses, can be used for flexible steam connections, flexible wiring conduits and intricate connections on lines carrying corrosive fluids. The tubing manufacturer will supply the name of the fabricator of this type of flexible hose on request.

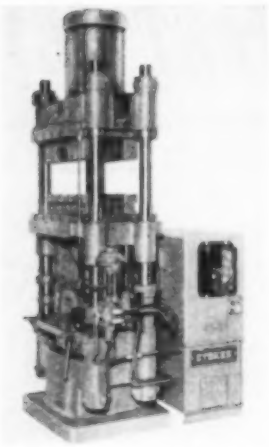
AIR OPERATED VALVE

For valves in sizes ranging from 4 to 12 in., the Hills-McCanna Co., 3025 Northwestern Ave., Chicago 18, Ill., is now offering the advantage of air operation from a remote point. Controls of this type can be provided for the company's Saunders-type diaphragm valves. An air-actuated piston mounted on the valve provides for opening, closing or holding the valve in an intermediate throttling position. For simple open and shut operation, Westinghouse Flexair controls are employed. Where opposed air operation is necessary to provide smooth throttling over a wide range, Flexair and Controlair controls are used together.

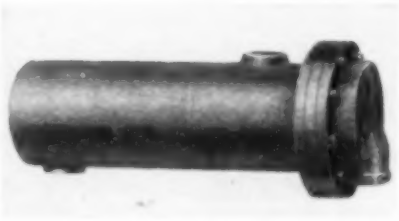
COMBINATION PRESS

For either transfer or compression molding a new combination press has been announced by F. J. Stokes Machine Co., Philadelphia 20, Pa. By using a single pumping unit, for applying pressure in compression molding and to lock the mold shut and supply hydraulic pressure to the transfer ram, it is stated that a highly efficient, readily converted dual-purpose press can be provided at a cost only slightly greater than that for a compression press alone.

An adaptation of the Stokes-Standard semi-automatic compression press, the machine has the transfer cylinder mounted on the head of the press, with operation of the ram controlled by a sequence valve. The power unit has greater capacity than in the usual compression press, to provide high mold-closing speed and high ram speed to work with preheated preforms in transfer molding. When compression molding is to be employed the transfer cylinder is readily cut out by closing a valve.



Combination compression and transfer press



Type R steam water heater

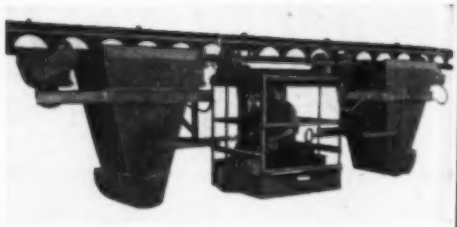
Various capacities and sizes are available. For transfer molding the press is said to have several advantages including rapid, positive toggle action for closing and locking the mold shut, reduction of waste, and employment of low hydraulic pressure to minimize maintenance costs.

WATER HEATER

For use with gravity recirculation systems, or where minimum friction loss in the water space is desirable, American District Steam Co., North Tonawanda, N. Y., has introduced the new type R water heater which is a compact, instantaneous unit with a steel shell and a 1¼-in. O.D. 16 B.W.G. copper U-tube removable heating element. The steam flows through the tubes and the water in the shell. The unit is produced in 22 sizes for a wide range of capacities and for water connection diameters ranging from 1¼ to 8 in. In addition to its obvious application for providing hot water for industrial washrooms, the unit also is intended by its manufacturer for water supply for heating, sterilizing and cleaning operations.

BUCKET CARRIER

Transportation of bulk materials is the function of a new motor-driven, cab-operated, double-bucket carrier for use on overhead tramrail systems, developed by the Cleveland Tramrail Division of the Cleveland Crane & Engineering Co., Wickliffe, Ohio. As appears from the accompanying illustration, the operation of the carrier and the opening and closing of the bucket gates are handled by the cab operator who sits in a swivel chair between the two buckets. This construction enables him to work in the direction of either bucket. A single variable-speed drum controller is located on one side of the cab but two foot-brakes are provided, one at either end, so that one is always in convenient reach. Push-pull levers for operating the bucket gates extend into the cab and permit emptying the materials in any amount and at any rate desired. In the unit illustrated the buckets are of 25 cu. ft. capacity each, designed for carrying a total load of 2 tons. Other sizes, however, can be supplied. The buckets are designed and located with reference to the overhead track so as to permit easy filling from overhead bins without interference or spillage. The two motorized travel drives, one at each end, are said to give speeds up to 600 ft. per min.



Cab-operated double-bucket carrier

Electronic a.c. galvanometer

ELECTRONIC GALVANOMETER

Known as the Har-Cam Galvascope, a new electronic a.c. galvanometer has been introduced by Harvey Radio Laboratories, 447 Concord Ave., Cambridge 38, Mass. Employing an electric "eye," the instrument permits visual determination of bridge balance. It is essentially an a.c. galvanometer of electronic type, containing no moving parts. Hence there is no waiting for an undamped galvanometer to come to rest, nor is the instrument damaged by mechanical shock, according to the manufacturers. The circuit consists of an a.c. amplifier, a signal rectifier, an indicator tube and a self-contained power supply.

SPECIMEN SHEAR

To FACILITATE the preparation of specimens of thin materials such as paper, plastics, metallic sheets and foils for stiffness tests, the Tabor Instrument Corp., North Tonawanda, N. Y., manufacturers of the Tabor V-5 stiffness gage, has developed a triple-cut specimen shear which cuts the test strip and detaches it from a sheet in one operation. To do so it is only necessary to place the straight edge of the sample sheet against the back gage of the shear and push down with a quick motion. Auxiliary weights for the V-5 stiffness gage in 3,000 and 5,000 units, extending the range of the instrument to cover twice the capacity of standard units, have also been announced.

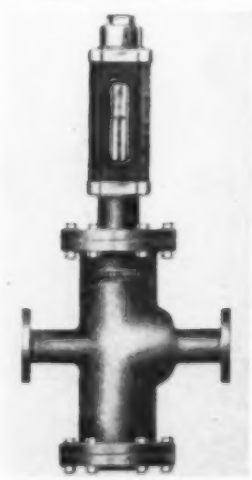
ARMORED ROTAMETER

To ENABLE a rotameter flow meter to be installed directly in a horizontal pipe line without offsets or other piping complications, Fischer & Porter Co., Hatsboro, Pa., has developed the new Series 400 Rota-Line armored valve-body rotameter. The instrument is an extension type meter which means that, although the metering actually takes place within a tapered tube of glass or metal, the meter is read by means of an indicator in an extension tube above the meter and out of the flow. As shown in the accompanying illustration the meter body is flanged for direct installation in the pipe line. Connections within the body are made in such a way that the incoming flow enters at the bottom of the tapered tube held centrally within the body, while the outflow leaves at the top of the tube. The tube may be either this company's new Bead-Guide design, or it may be of metal, if necessary.

Either the company's Stabl-Vis float or its Beta-Ultra Stabl-Vis float for maximum immunity to viscosity variations may be employed. The meter is normally built for pressures up to 300 lb. but can be secured in extra heavy designs for higher pressures. The standard scale length is 127 mm. but the meter may be obtained in scale lengths of 250 mm. or 600 mm., if desired. This meter is stocked in cast iron, steel, bronze and stainless steels and is also obtainable in special metals or alloys such as aluminum, lead, Hastelloy or Durimet. Available as a standard indicating meter, it may also be secured in recording, recording-controlling, or totalizing types with readings at the meter or at a remote location. This construction is claimed to permit the meter body to take full pipe line strain, to make reading easy and to give full protection to operators in event of high pressure service.

Shear for stiffness gage specimen

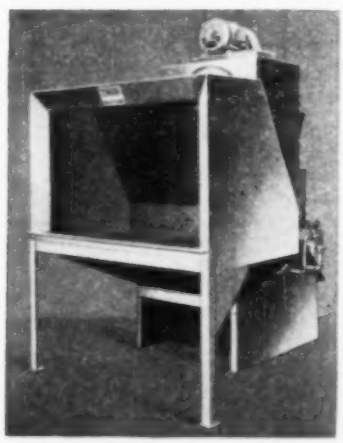
Series 400 Rota-Line armored valve-body rotameter



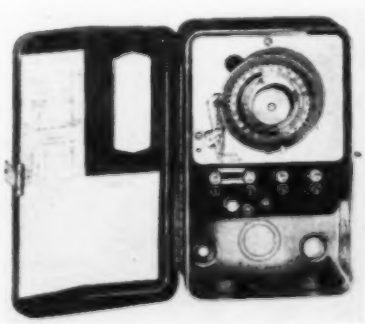
METAL SPRAY BOOTH

FOR THE BENEFIT of users of metal spraying equipment, the Metallizing Engineering Co., Long Island City 1, N. Y., has announced a complete line of metal spray booths and dust collecting equipment designed to handle metal spray dust. According to the manufacturer, ordinary spray booths designed for paint and similar materials do not solve all the problems created by the strong blast of air and metal from a metallizing gun. The new equipment includes spray booths for exhausting to the present exhaust system, to the atmosphere, or to a wet collector supplied by this company. For applications where the spray gun is used on work in a lathe, a special exhaust unit is available mounted directly on the lathe carriage and moving with it. Through the use of wet collectors supplied by the company, valuable metal particles may be reclaimed.

Booth for metal spraying



Telechron-operated time switch



IMPROVED TIME SWITCH

FURTHER improvement has been announced by Paragon Electric Co., 37 West Van Buren St., Chicago 5, Ill., in its 300 Series time switch. The switch is now equipped with a Telechron industrial type self-starting synchronous motor said to add years to the life of the switch. The motor is self-oiling and practically instantaneous in starting under full rated load. The switch capacity is 3,000 watts per pole, suitable for controlling blowers, pumps, valves, motors and other equipment. Design of the switch provides for easy installation, according to the manufacturer.

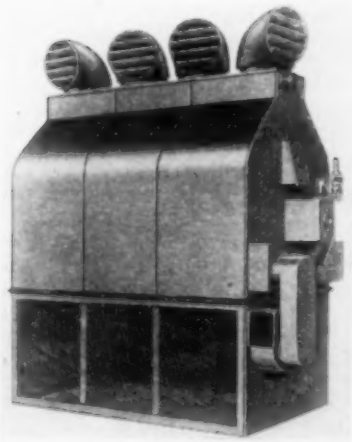
DIRECT FIRED HEATER

CAPACITIES from 75,000 to 2,000,000 B.t.u. per hour, for all types of fuel, are available in a new line of direct-fired heaters manufactured by Herbert H. Davis Co., Cicero, Ill. The units are made entirely of steel, are completely self-contained, are equipped with fully automatic control systems, lending themselves to a wide variety of applications, either for air distribution direct through rotatable diffusers, or through ducts. The units are shipped in two sections making possible unloading and placing with greater facility. Entry can be made through smaller building openings and shipment can be made to any part of the United States by truck. Filters may be applied without special transformations requiring additional floor space. It is claimed that the lower resistance through the heater provides quieter fan operation and lower motor horsepower. Less floor space, easier tube cleaning and self-contained, automatic, thermostatically controlled humidification are other features.

EQUIPMENT BRIEFS

TO FACILITATE gas-cutting operations, the B & W Co., 7610 South Figueroa St., Los Angeles 3, Calif., has developed a straightedge of aluminum alloy which can be held in any position on steel plates

Self-contained industrial heater



by means of two Alnico magnets which are said to effect secure attachment. The device then serves as a guide for the torch. It also serves to control the angle of the torch so that any bevel angle can be held.

IMPROVEMENTS in electrolytic conductivity measurements on liquids are claimed possible with a newly developed dip type conductivity cell of high cell constant now manufactured by Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J. Of heavy walled Pyrex glass and platinized platinum sheet construction, the new type CEL-H cell is made with cell constants of 5, 10, 20, 50 and 100. Designed for laboratory use, the cell can also be mounted in a stainless steel perforated guard tube for plant use.

A NEW electronic feed regulator, said to do away with the guesswork of human control, is being employed on grinding mills of various types according to Mosher Electronic Controls, 130 West 42nd St., New York 18, N. Y. The device maintains the load on the pulverizing equipment at maximum rated capacity of the connected motor. It is claimed that conservative estimates indicate production increases of from 20 to 35 percent per mill as compared with manually controlled feeding.

FORMERLY used for metering water at ordinary temperatures, the Propeloflo meter made by Builders-Providence, Inc., Providence, R. I., is now available without extra cost for metering hot water up to 250 deg. F. A special high temperature grease is employed for efficient lubrication.

FOR THE absorption of liquid spills including oils, greases, chemicals and acids, the Alexite Engineering Co., Colorado Springs, Colo., has introduced Super-Absorbit, a highly absorbent mineral said to absorb 392.8 percent of its weight in water and 315.62 percent in oil. The material contains a minimum amount of abrasives, is fireproof and dielectric. It is claimed not to become slippery or to mat when saturated and to be readily sweepable.

HANDLING of sludge and other viscous liquids is the function of a steam-jacketed rotary pumping unit of improved design now available from the Blackmer Pump Co., Grand Rapids, Mich. Having a capacity of 500 g.p.m. at 150 lb. per sq.in., the pump is powered with a 75-hp. gear-head motor. The pump construction is of iron, with bronze fittings, and the steam jacket is suitable for pressures up to 125 lb. per sq.in. Similar pumps in capacities of 50, 90 and 200 g.p.m. are available. The pump employs this company's well known swinging vane design.

PORTABLE BEAM SCALE

MODERNIZED design has been incorporated in an improved portable beam scale now offered by the Howe Scale Co., Rutland, Vt. Designated as Model 54, the scale has a capacity of 1,000 lb. and is said to offer features making for quicker, more accurate reading, as well as longer scale life. The graduations are die-cast on the lower edge of the beam, showing clearly against a dark red background. Reading accuracy is further enhanced by a center-indicating poise with a non-removable set screw. Sustained accuracy over long periods of service is achieved, it is claimed, through the use of four ball bearings set between the platform and the pivot bearings to absorb the brunt of the platform movement which otherwise would be transmitted directly to the knife edges of the pivots, thus dulling them and impairing the scale sensitivity. The platform, cast in one piece, has an extra long skirt to keep dust and dirt out of the mechanism. Either a single beam graduated to 100 in half pounds, or a full-capacity beam graduated to 100 by half pounds on the upper bar and from 100 to 1,000 on the lower bar may be had.

TESTING MACHINE

CAPACITY up to 60,000 lb. for making tensile, traverse and compression tests is provided by a new universal testing machine designated as model MP-10, announced by Steel City Testing Laboratory, 8843 Livernois Ave., Detroit 4, Mich. This hydraulic machine employs a piston and cylinder having a lapped finish, carefully fitted without packing to insure a minimum of friction. Both upper and lower pulling heads are of conventional type, with wedge-type jaws for both flat and round specimens. A load regulating valve is provided to maintain a uniform load rating. Any load can be held for any period at the will of the operator. The cylinder provides a maximum stroke of 6 in. and the traverse table a maximum span of 30 in. All equipment including motor, hydraulic pump, necessary valves and gages is included.

DIAL THERMOMETER

VARIOUS standard ranges are available between the limits of −90 deg. F. and +1,000 deg. F. in a new line of bimetallic dial thermometers introduced by Equipoise Controls, 342 Madison Ave., New York 17, N. Y. The new instruments are said to employ permanently calibrated, highly accurate and extremely responsive precision bimetallic helical coil units. Cases are of alloy steel in most sizes, the metal dials having large easy-to-read numerals and temperature graduations. Expansion of the bimetallic coil rotates a small shaft and indicating pointer as one unit over the entire scale range, without pivots, mechanical linkages or gears. Over-range protection is provided, permitting the temperature to go 50 percent or more beyond the end of the scale without damage to thermometers for ranges up to 500 deg. F., and 10 percent, for ranges up to 1,000 deg. F. Dial sizes of 2, 3 and 6 in. are obtainable. Instruments are easily installed by connecting a ½ in. standard connection directly to the point of service or into a separable pocket or other mounting.

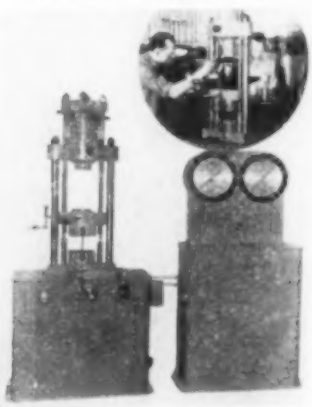
ALL-PURPOSE FILTER

FOR GENERAL industrial water filtration, particularly where "polishing" of the water is required, the R. P. Adams Co., 55 Chicago St., Buffalo, N. Y., has introduced the new model TF-1 twin filter which is a self-contained unit said to be easy to install and self-cleaning in operation. The unit contains two chambers, each employing a tubular filter element. When one tube is to be cleaned, the raw water to that tube is shut off by means of a built-in valve and the backwash valve is opened. This allows the filtered water from the other twin tube to pass back through the pores of the fouled tube and wash the dirt out to the sewer. Three kinds of filter tubes are available including a porous stone tube for general service on city water a porous carbon tube for resistance to temperature shock; and a built-up Monel cloth tube for large capacity and a reasonable degree of separation. Depending on the clarity of the feed water and the grade and kind of filter unit employed, capacities range from 8 to 65 g.p.m., for the twin unit.

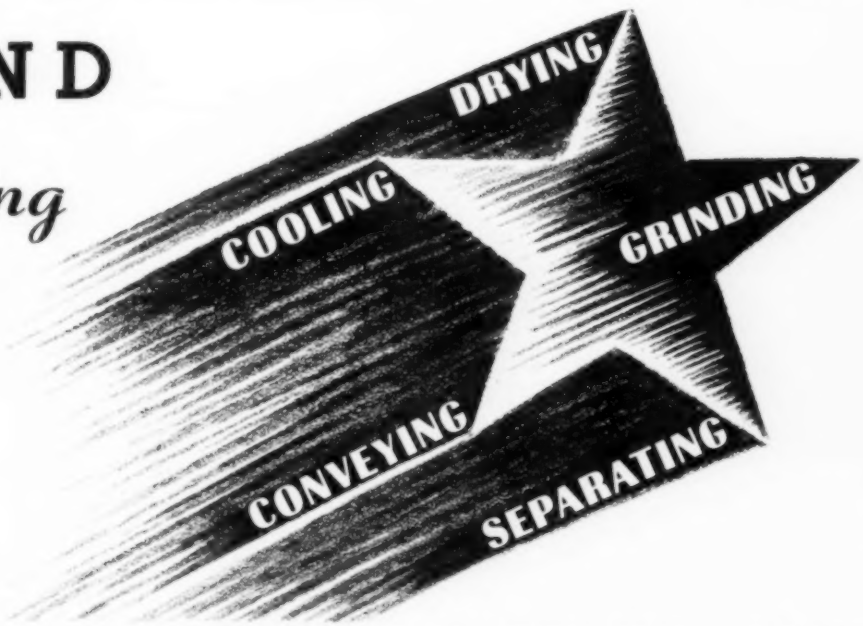
Bimetallic dial thermometer

Modernized beam scale

60,000 lb. testing machine



Simplify YOUR PRODUCTION *with* RAYMOND *Flash Drying*



COMBINED *into One Operation*

Typical set-up for a Raymond Flash Drying System with Cage Mill

Flash Drying is applicable to different types of Raymond mills, and it offers a rapid, economical method of handling powdered materials by a single pass through the machine.

With a Cage Mill, a flash drying and incinerator system is processing wood waste, starting with initial moisture of 80% and delivering a finished product at 5% to 10% final moisture.

An Imp Mill, equipped with 2-stage flash drying system, is used for drying and disintegrating stearates, reducing initial moisture of around 55% to a final content of ½ of 1%.

A Roller Mill is employed for drying and pulverizing talc to a fineness of 99% minus 325-mesh, removing moisture by means of heated air introduced into the mill system.

Many other materials . . . chemicals, pigments, food products, filter cake, industrial wastes . . . may be processed at new low cost by Flash Drying.

Write for Raymond Catalog #54

SINCE 1887

RAYMOND PULVERIZER DIVISION

COMBUSTION ENGINEERING COMPANY, INC.

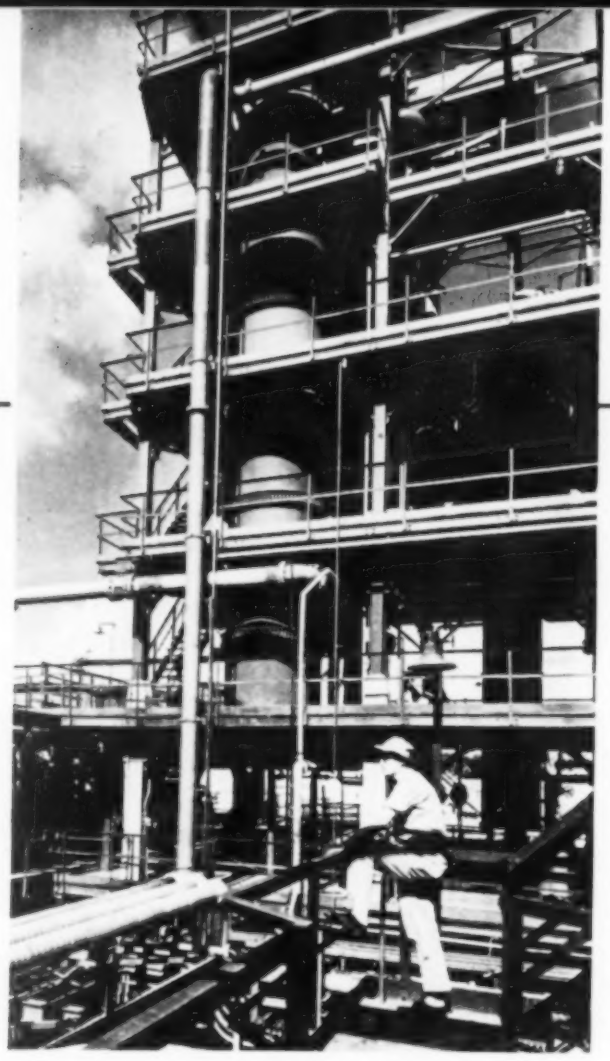
1311 North Branch St. Chicago 22, Illinois

SALES OFFICES IN PRINCIPAL CITIES

CANADA: COMBUSTION ENGINEERING CORP., LTD., MONTREAL

A Chem & Met PICTURED FLOWSHEET

ALCOHOL FROM PETROLEUM



1 Stripping column separates acid from crude alcohol-ether-water mixture at Baton Rouge refinery

When the alcohol plant of the Standard Alcohol Co., subsidiary of Standard Oil Co. (New Jersey), adjacent to the Baton Rouge refinery commenced operating in March, 1943, it became the first petroleum refinery in the world to manufacture ethyl alcohol.

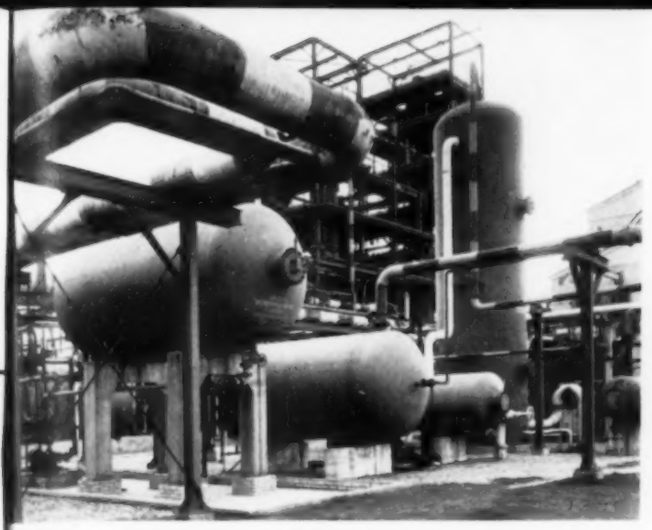
The alcohol plant is divided into three sections: crude alcohol producing, alcohol finishing, and denaturing and handling. Ethylene from the petroleum refinery is cleaned and piped to the alcohol plant. It first goes to an absorber where it is reacted upon by sulphuric acid with the formation of a mixture of monoethyl and diethyl sulphates. The mixed esters are pumped to a hydrolyzer where they are decomposed into ethyl alcohol, diethyl ether, and small volumes of other materials. This mixture passes to a stripping still in which the acid is separated from the vaporized mixture of alcohol, ether and water. Small amounts of acid carried over with the alcohol and ether are removed in a scrubber. The acid-free mixture is condensed and sent to the finishing plant.

First step in finishing is to remove ether, which is done by introducing steam at the proper temperature. Next, water in the crude alcohol is removed in a fractionating tower. The alcohol in vapor form condenses into 190-192 proof which is pumped to unfinished alcohol tanks. It is then denatured and pumped to the loading rack for shipment.

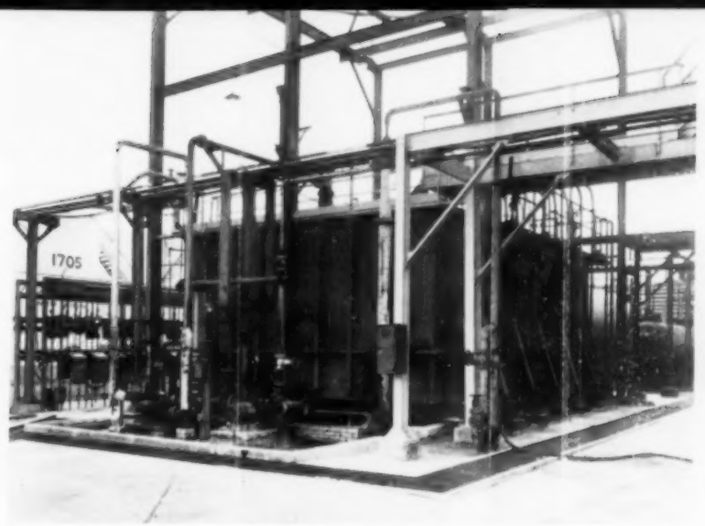
The sulphuric acid used in treating the ethylene is recovered and concentrated for reuse. For this purpose a Simonson-Mantius two-stage vacuum acid concentration system is used. The weak acid goes from the stripping column to an acid reboiler in which the acidity is raised to about 70 percent. The water evaporated from the acid is utilized and saves the cost of stripping steam in the generator. The acid is cooled and pumped to storage. As required it passes to the first stage evaporator. Here acidity is raised to 89 percent. It then overflows into the second stage evaporator in which the concentration is raised to the final desired strength.

Three Dowtherm vaporizers, each with an hourly output of 30,000,000 B.t.u., supply the heat. Sulphuric acid recovery was a new field for this method of heating and is of interest because it represents the largest single installation of this type of vaporizer.

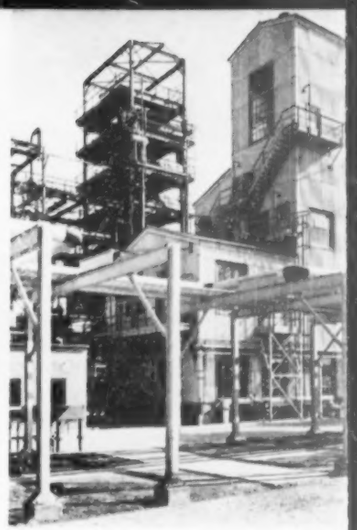
CHEMICAL & METALLURGICAL ENGINEERING
November, 1945
PAGES 136 to 139



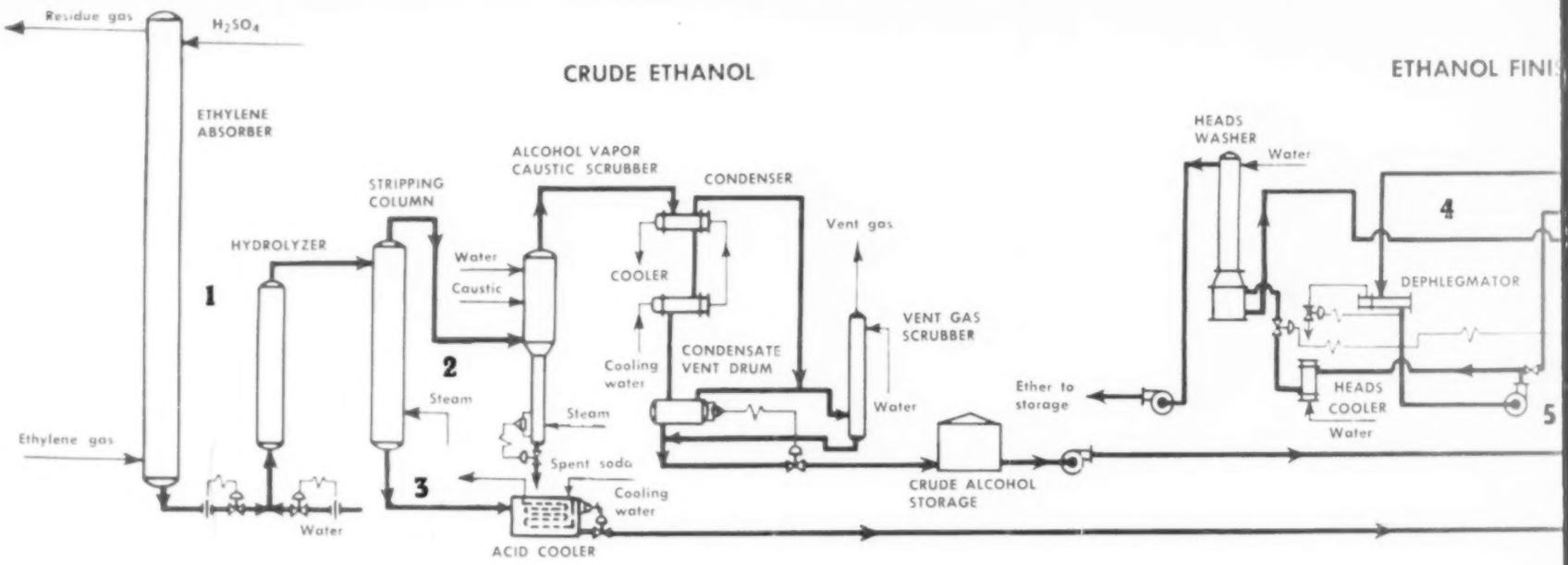
Emergency blowdown equipment is in foreground and crude ohol in background of Standard Oil's alcohol plant



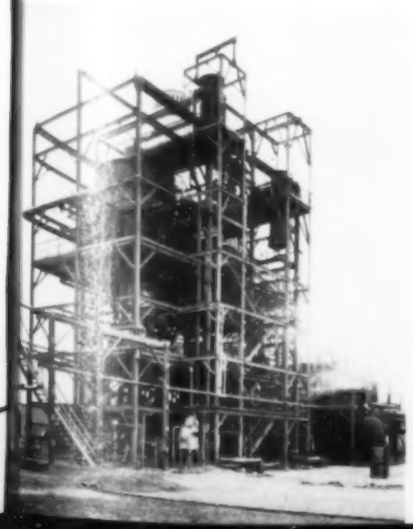
3 Sulphuric acid leaves the stripping column and passes to a cooler shown here with pumps for carrying it to storage



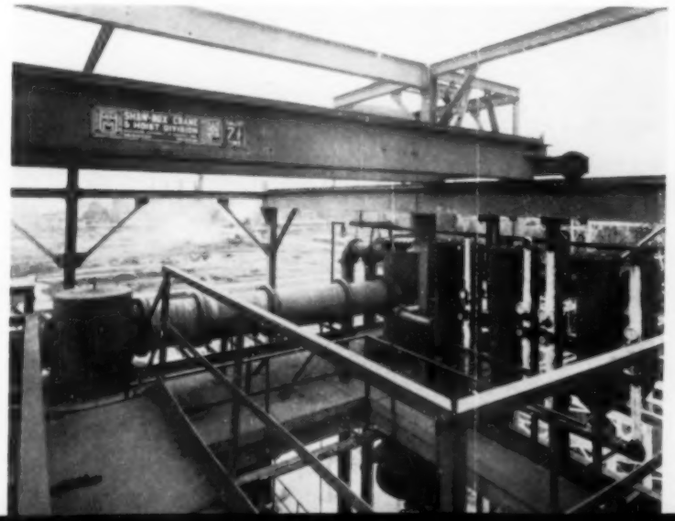
4 From crude alcohol unit in rear uct passes to finishing unit in fo



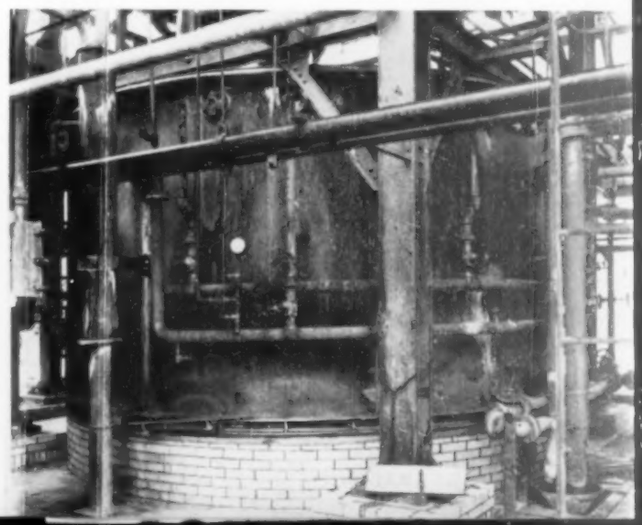
8 Simonson-Mantius two-stage vacuum sulphuric acid concentrating system

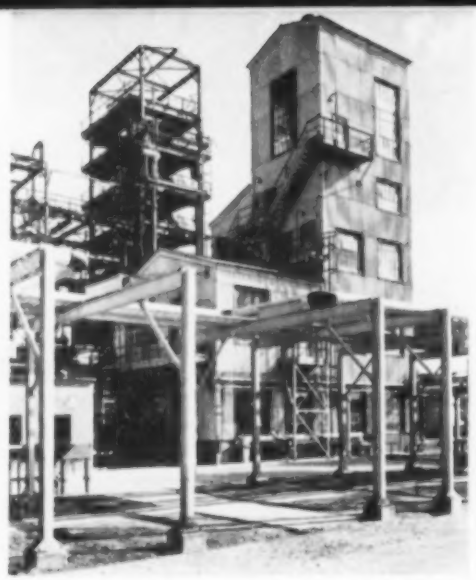


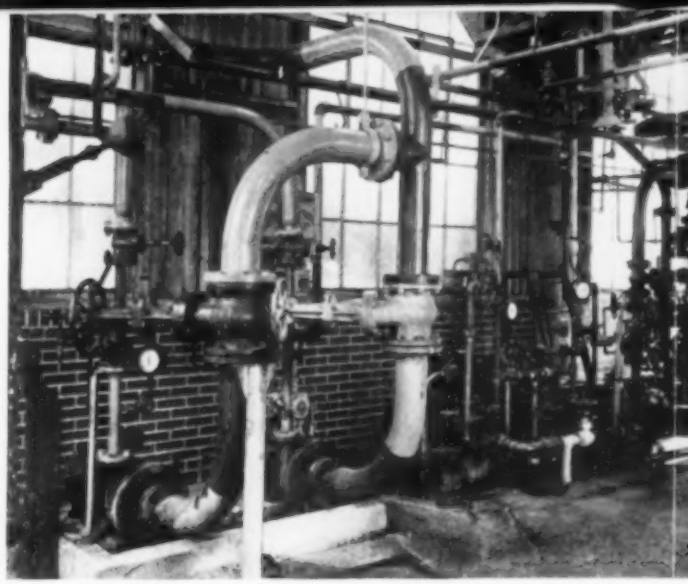
9 Steam booster and steam jet evactors in the sulphuric acid concentration system at the alcohol plant



10 From the second stage concentrator the acid flows by gravit to the finished acid cooler shown here



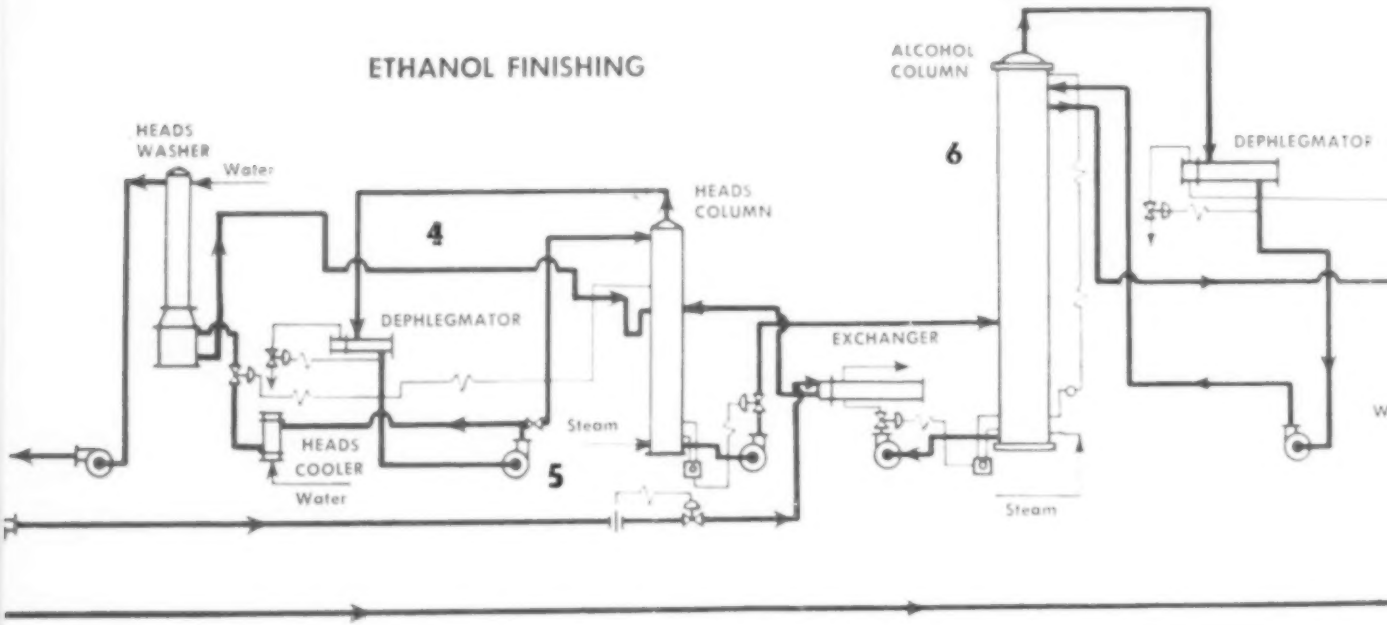




· to a cooler

4 From crude alcohol unit in rear the product passes to finishing unit in foreground

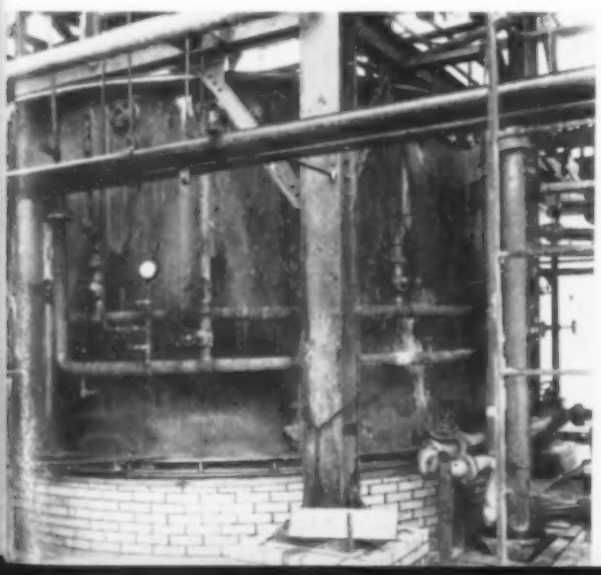
5 In the finishing unit these pumps are used to transfer the ma being refined from one operation to another

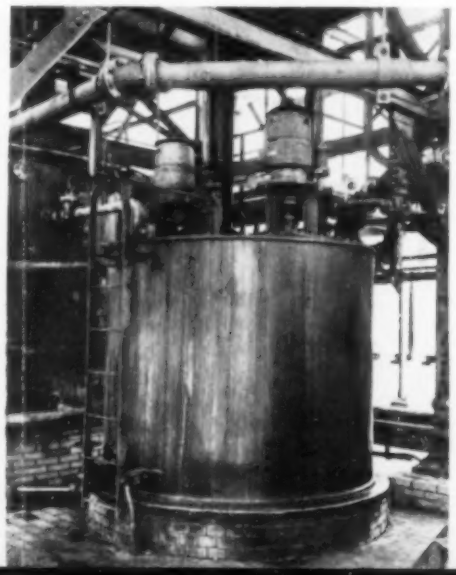


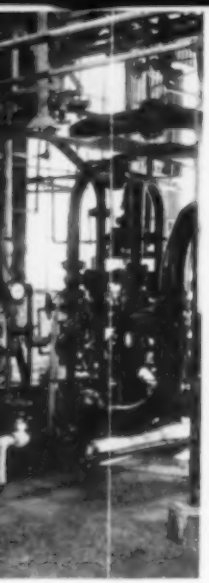
u the second stage concentrator the acid flows by gravity ished acid cooler shown here

11 Cooled recovered acid passes to pump tanks shown and then to storage

12 Three Dowtherm va hr. capacity, are used in







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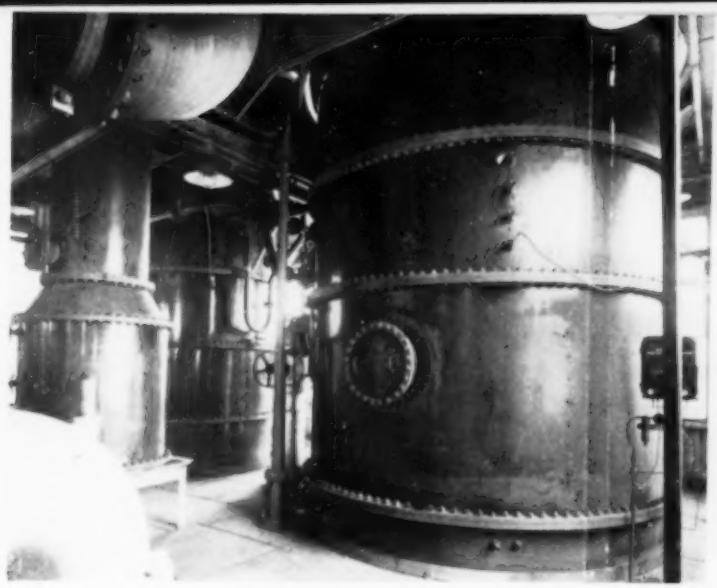
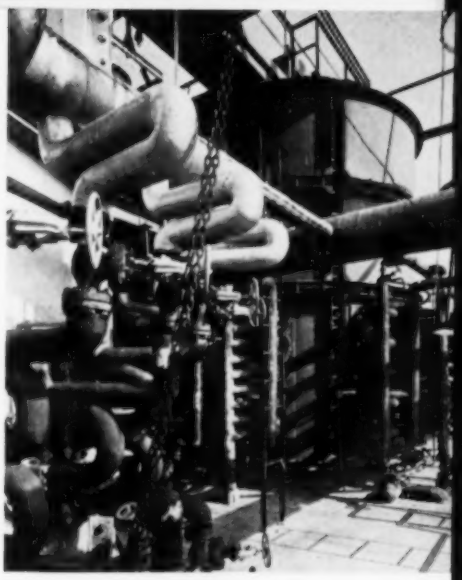
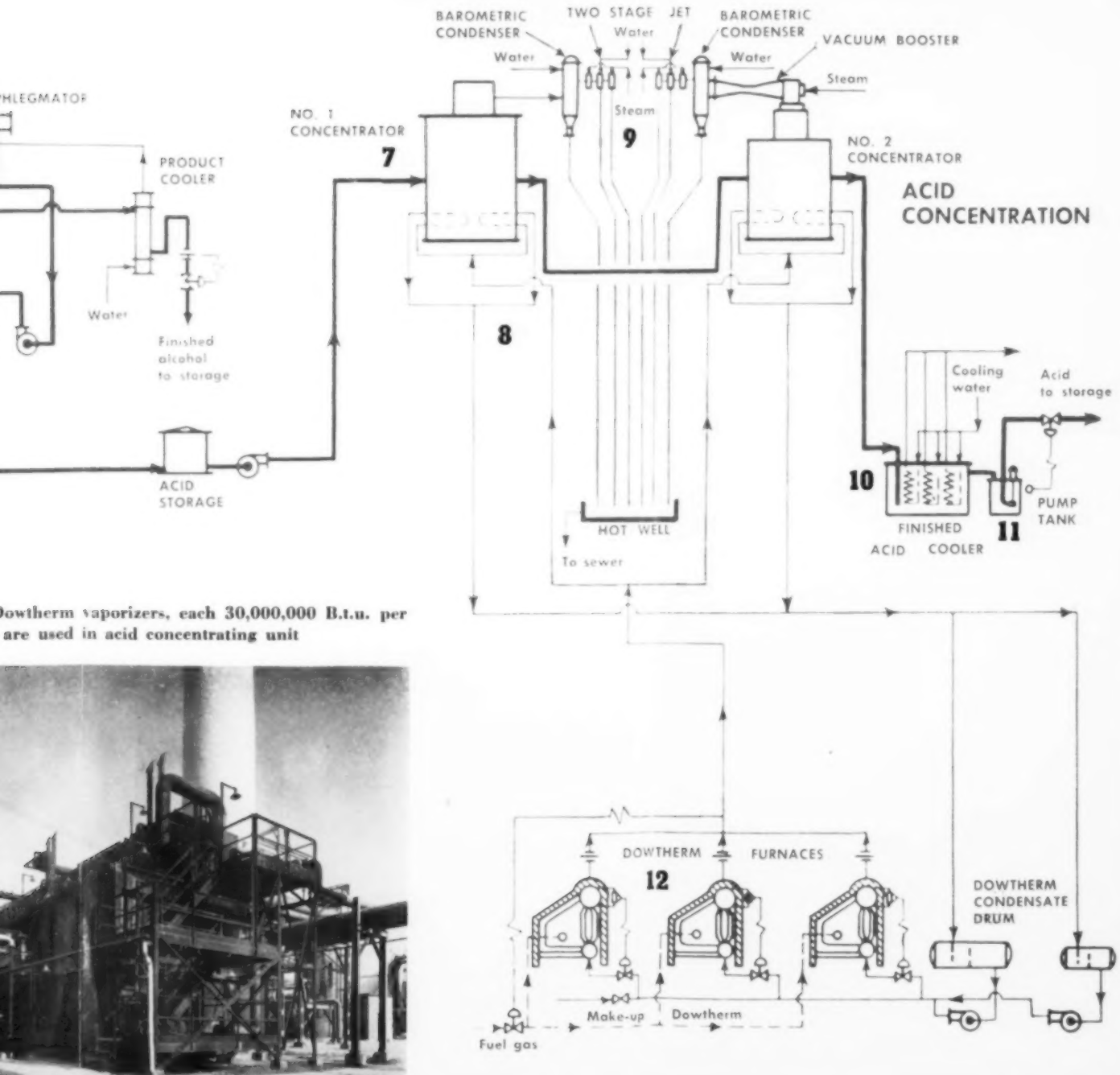


6 Ether washer, ether removal columns, and alcohol rectifying column in alcohol finishing plant



7 First stage concentrator in the acid concentration unit



Dowtherm vaporizers, each 30,000,000 B.t.u. per are used in acid concentrating unit

THE PERKIN-ELMER

All-Purpose Spectrometer

Model 12B

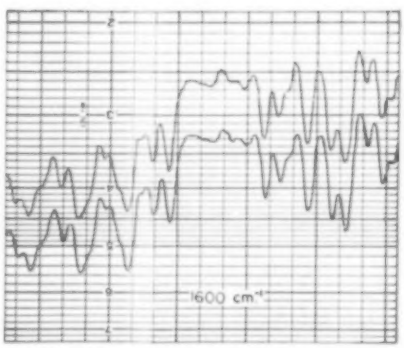
The greatest commercial application of infrared spectroscopy has been such control analyses as were encountered in the wartime synthetic rubber and petroleum industries. It would have been a comparatively simple matter for the Perkin-Elmer Corporation to design a routine spectrometer specifically for this type of work. But infrared spectroscopy is more than *this*. It can be used for fundamental research on the chemical and physical properties of materials, the identification of atomic groups and complex compounds, the control of organic synthesis, and the qualitative or quantitative analysis of complicated mixtures.

For this broad field the Perkin-Elmer Corporation designed an instrument which would (1) meet the requirements of present-day analysis, (2) provide in addition an optimum of *resolution*, of *accurate reproducibility*, and of *versatility* to meet any present or future advances in *analysis* or *research*, and (3) be low-priced. This required the combination, in one instrument, of exceptional optics, thermal and electrical stability, and elasticity of design to preclude the necessity of a different model for each specific purpose.

These aims have been achieved in the *one* All-Purpose Infrared Spectrometer shown above complete with amplifier, recorder, motor drive, and approximate percent transmission attachment.

As proof of this achievement, consider these four points:

1. Resolution and Stability



The above figure is a duplicate recording of a portion of the 6μ water vapor spectrum from a production line instrument. Compare this resolution with that of any published water spectrum from rock salt optics. In order to show the reproducibility of the spectrometer and accessories the first spectrum was recorded, the zero point shifted, and the spectrum was repeated. Such resolution and stability are necessary for advanced analyses and research.

Under the resolution conditions of typical present-day analysis, the following recorded output has been obtained over a two-hour test period: Zero drift—less than ±½% of full scale deflection, source constancy better than ±½% of full scale, signal to noise ratio 1000:1 (noise level, 2×10^{-7} volts).

2. Prism Interchange

This rapid, accurate feature permits complete research or analysis with optimum resolution of the spectrum to 25μ.

3. Approximate Percent Transmission

A simple device furnishes automatic recorded spectra directly in approximate percent transmission or optical density.

4. Other Features

The spectrometer also meets the primary requirements of temperature compensation, stray light correction, rapid calibrated recording, reproducible slits, many types of accessory cells, and the elimination of galvanometers and atmospheric interferences.

P E C

THE PERKIN-ELMER CORPORATION

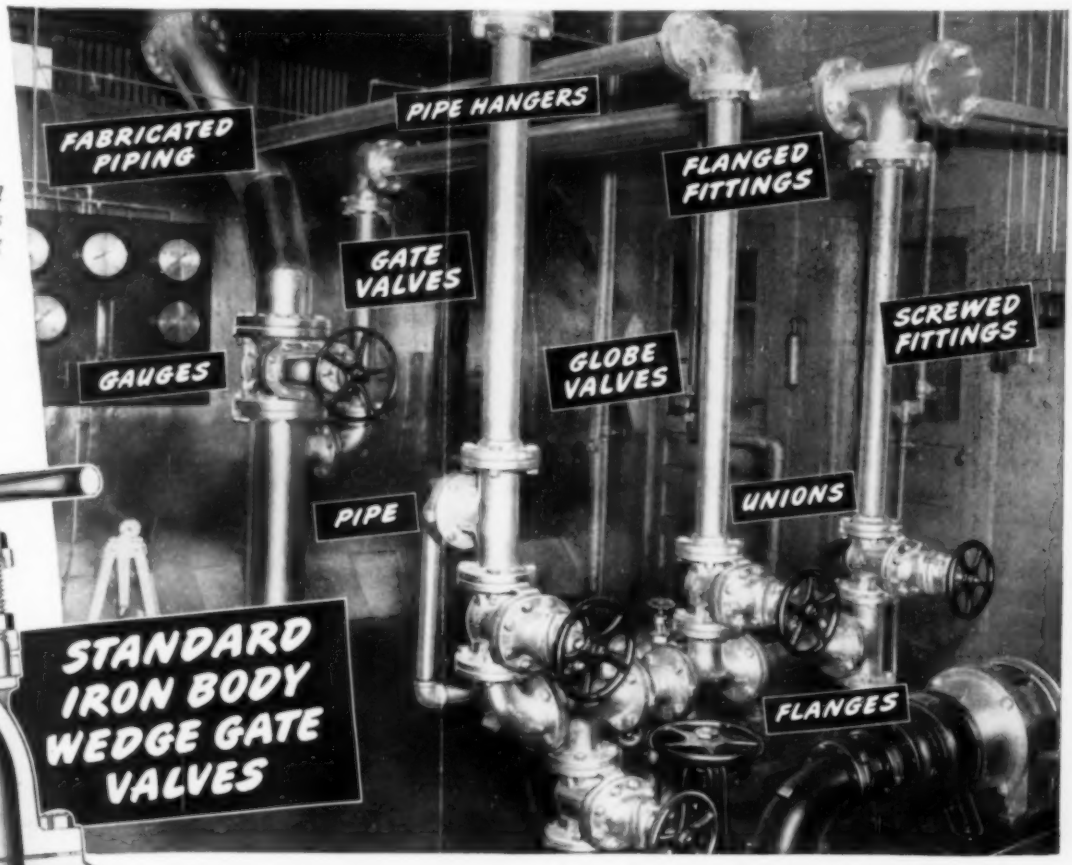
GLENBROOK · CONN·

Puzzled About Piping Equipment?
CRANE can help you

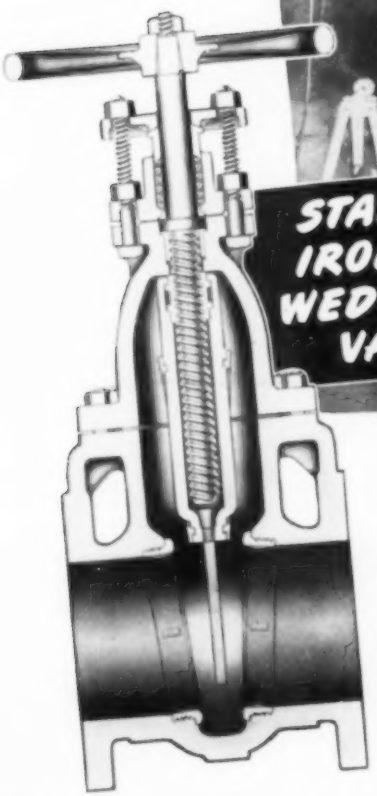
ONE SOURCE OF SUPPLY • ONE STANDARD OF QUALITY • ONE RESPONSIBILITY

Piping systems operate under varying conditions. What conditions should dictate your choice of piping materials, you can best determine. Then Crane helps you meet those specific requirements with the world's largest line of valves, fittings, pipe and piping accessories for all applications. By demonstrating the merits of all types of materials, Crane, with 90 years' experience, enables you to choose correctly for every need.

Ordering from the Crane line simplifies all piping jobs. Your Crane Branch or Wholesaler supplies all materials. You're sure to get a better installation and better performance with all parts of uniform quality, backed by single responsibility. This *complete* Crane service is *made-to-order* for your peacetime program.



Piping to chemical processing chambers in lumber treating plant.



SERVICE RECOMMENDATIONS: **Crane Standard Iron Body Wedge Gate Valves** are suited for many services in process and power lines at all working pressures up to 125 pounds steam. Brass trimmed valves are recommended for steam, water or oil lines; all-iron valves for oil, gas or fluids that corrode brass but not iron. Made in O.S. & Y. and Non-Rising Stem patterns. See page 101 of your Crane Catalog.

Working Pressures

Size of Valve	Screwed or Flanged End Valves		Hub End Valves
	Saturated Steam	Cold Water, Oil or Gas, Non-Shock	Cold Water or Gas Non-Shock
2 to 12 in.	125 pounds	200 pounds	200 pounds
14 and 16 in.	125 pounds	150 pounds	150 pounds
18 to 24 in.	*	150 pounds	150 pounds

*For steam lines larger than 16-in., Crane 150-pound Cast Steel Gate Valves are recommended. (For sizes under 2-in., use Crane Clamp Gate Valves.)

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. • *Branches and Wholesalers Serving All Industrial Areas*

CRANE

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VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

You'd be amazed, Mr. Murdoch

ALTHOUGH some theoretical accomplishments in gas date before his time, it was William Murdoch (1754-1839) who worked out the first method for gas production, storage and purification on a commercial scale. In 1792 he was able to light his cottage and office with gas, and by 1802 sufficient progress had been made to illuminate a factory in Soho in celebration of the peace of Amiens.

Great credit is due this man for providing the practical point of departure towards an industry which is now far greater than even he could have guessed. If Murdoch were to return to life today he would be thoroughly amazed at the immense knowledge about gas which has accumulated, the many applications, the study and p sonal experience required before one can be at home modern industrial gas processes.

When in need of new or improved gas process facilities it pays to make certain of the right answers calling upon the Girdler organization of men who spec ize in this complex and ever-changing field.

Girdler offers processes for gas manufacture, purificati separation, and dehydration. Consult us on your proble concerning hydrogen sulphide, carbon monoxide, carbon d oxide, natural gas, refinery gases, liquid hydrocarbons, h drogen, nitrogen. Originators of the Girbotol Process.

WE DON'T GUESS ABOUT GAS

CHEMICAL ENGINEERS AND CONSTRUCTORS

The GIRDLER CORPORATION

Gas Processes Division, Dept. CM-11, Louisville 1, Ky.
New York Office . . . 150 Broadway, New York 7, N. Y.

NEW PRODUCTS AND MATERIALS

R. W. PORTER, Assistant Editor

CONTENTS

Organic Alkali 143
Cellulose Propionate 143
Hydrogen Peroxide 143
Film Developer 143
Bubble Plastic 143
Rubber Conductor 144
2-Ethanolpyridine 144
Ethocel Container 144
Coating Resins 144
Synthetic Rubber 144
Protective Covering 144
Canned Hydrogen 144
Nylon Rods 146
Aircraft Lacquer 146
Thermoplastic Sealing Compound 146
Cleaning Solvent 146
Flexible Coating 146
Organic Solvent 146
Removable Protective Film 146
Tetramethylene Chloride 146
Deodorants 146
Synthetic Wax 148
Corrosion-Resistant Coating 148
Fiberglas Bandage 148

ORGANIC ALKALI

AN ORGANIC alkali, phenyl trimethyl ammonium hydroxide has recently been developed by the Monsanto Chemical Co., Boston, Mass. While this new chemical is at present only available in experimental quantities, it is said to have good possibility as a practical neutralizer of acids where solubility of the product salt in polar organic solvents is desired, and as a strong organic alkali for the manufacture of organic salts such as silicates.

Phenyl trimethyl ammonium hydroxide, $C_6H_5(CH_3)_3NOH$ in a 19-20 perecnt aqueous solution is a clear liquid yellow to light orange in color, has a freezing point below — 20 deg. C., weighs 8.8 lb. per gal., is stable below 350 deg. C. at concentrations up to 20 percent, and is non-flammable. Being a strong alkali it is very corrosive to certain materials. It causes rapid disintegration of cellulose, and will etch glass badly, but has no action on steel drums. Care must be exercised in handling this material since it burns the skin in the same manner as any strong alkali, requiring the use of rubber gloves.

CELLULOSE PROPIONATE

A NEW plastic, Forticel, has been announced by the Celanese Plastics Corp., New York, N. Y. Although the chemical process of uniting cellulose from linters or wood plup with propionic acid from natural gas to produce cellulose propionate has been known for some years, commercialization has had to await the availability of this acid at a reasonable price.

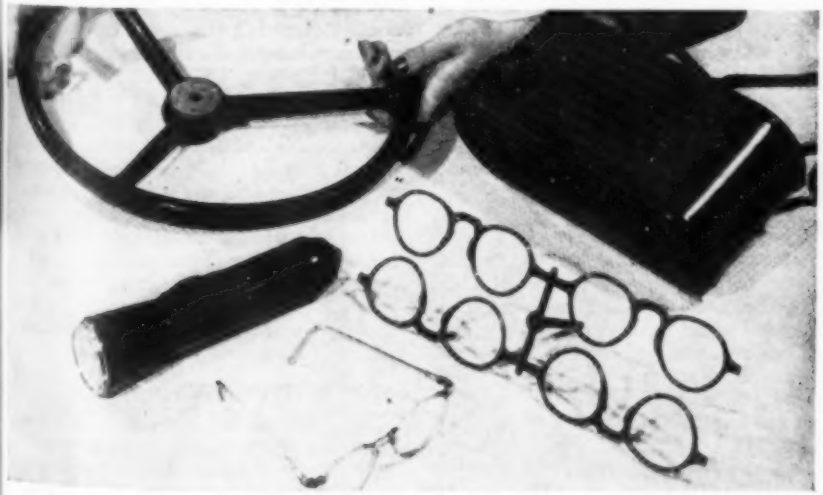
Now expected to come on the market early next year, this odorless thermoplastic is a blend of cellulose propionate and plasticizers calculated to speed injection molding or extrusion by as much as 25 percent. Since the material has a specific gravity of 1.2 or less, a pound is said to make 8 percent more pieces than a pound of cellulose acetate. Toughness or impact strength and dimensional stability are high in comparison with other similar materials; water absorption is low; electrical properties are said to be excellent. Forticel is expected to be available in all colors and a brilliant mold finish is obtained without mechanical polishing.

HYDROGEN PEROXIDE

CONCENTRATED hydrogen peroxide has up until recently been only a laboratory curiosity and has always been considered too hazardous for practical use. The Buffalo Electrochemical Co., Inc., of Buffalo, N. Y., however, announces commercial production of hydrogen peroxide, 90 percent plus by weight. This concentrated oxidant of high purity is a stable material that can now be handled without hazard. It is known that hydrogen peroxide, 80 to 85 percent by weight, has been produced by the Germans for use in rocket weapons. However, this new product made by Buffalo Electrochemical, has proved superior to the German hydrogen peroxide with respect to concentration, purity, stability and safety in handling.

Hydrogen peroxide is considered an ideal oxidant, mainly because it leaves no residue. Accordingly, this concentrated product promises to be of great utility in fundamental chemical reactions. Not only is it applicable to many new reactions because of its comparative freedom from water, but many known oxidation reactions take place faster and more completely with this product. Possible commercial applications are said to be innumerable. This 90 percent hydrogen peroxide is now available.

Wide variety of articles made from Forticel (cellulose propionate)



FILM DEVELOPER

PACKAGED in a container that prevents spoilage, a new Kodak Universal MQ Developer has been announced by the Eastman Kodak Co., Rochester, N. Y. Replacing the old MQ tubes and the Eastman standard Universal and film and plate developers, this new material is hermetically sealed in envelopes which are inclosed in a cardboard folder similar to a knapsack. The two envelopes make 32 oz. of film developer for tank use or 12 oz. for tray development of films or paper.

BUBBLE PLASTIC

POLYSTYRENE plastics are well known, but Styrofoam developed by the Dow Chemical Co., a derivative of polystyrene consisting of 97 percent air by volume, is said to be the lightest in weight and lowest in cost of all solid commercial plastics. It is made by inflating cells of the parent material with air to form a non-permeable, multi-cellular mass of extremely low density. Similar to other polystyrene plastics it has good insulating qualities and a high resistance to weather, mold growth, rot, and decay. It does not absorb water, even after long periods of immersion.

Styrofoam is 1/42 as heavy as polystyrene and is claimed to be 30 percent more

buoyant than cork. Despite the fact that the thin walls of the many small bubbles of which Styrofoam consists make up only 3 percent of the plastic's entire volume, the material has considerable structural strength and requires no special care to prevent damage in handling. It has good workability qualities and can be shaped and formed by conventional woodworking equipment and can be successfully bonded to itself, to wood and metals or other materials. Although it can be burned it is no more flammable than wood.

Major postwar use of this new plastic will probably depend chiefly upon its excellent heat insulating qualities and its nonabsorption of water which together with its extreme light weight (about 1 lb. per cu. ft.) and low cost will make it desirable for many insulating jobs. At the present time this material is available in one density and one color—white. It is supplied in small experimental quantities in the shape of boards not more than 3 in. in thickness.

RUBBER CONDUCTOR

CHANGING rubber from an insulator to a conductor was a technique perfected during the war in connection with the manufacture of safety equipment to control static electricity in powder and shell plants. This safety equipment included conductive rubber flooring, table tops, soles and heels for worker's shoes and containers used in handling explosives. Static electricity was quickly conducted to the ground, eliminating the dangerous sparks. Developed by the U. S. Rubber Co., this new rubber is said to have a number of potential peacetime uses. One of the devices already developed is a new type of brooder developed for poultry raisers. The rubber is made into the form of a pad less

Rubber pad radiates heat

than 2 ft. square, and is made conductive by the addition of certain chemical compounds. The entire pad becomes warm producing a radiant heat which is evenly diffused to all parts of the brooders. Temperatures are kept uniform by an automatic thermostat which can be set at any desired level. This new unit reportedly consumes less electricity than other heaters constructed with coiled wire.

2-ETHANOLPYRIDINE

NOW COMMERCIALLY available, 2-ethanolpyridine has in the past only been available in laboratory quantities. It is manufactured in quantities up to and including carload lots by the Reilly Tar and Chemical Corp., Indianapolis, Ind. Among the suggested uses for this new chemical are in the manufacture of pharmaceuticals, insecticides, fungicides, rubber accelerators, anti-oxidants, disinfectants, lubricants and for numerous organic syntheses. Its solubility properties suggest its use as a coupling or blending agent. Some of the properties of 2-ethanolpyridine are shown in the accompanying table.

Approximate wt. per gal., lb.		9
Purity, percent minimum		95
Molecular weight		123
Boiling point:	At 10 mm. Hg, deg. C.	117
	At 760 mm. Hg with decomposition, deg. C.	235
Solubility:	Water	Miscible
	Aliphatic hydrocarbons	Slight
	Aromatic hydrocarbons	Miscible
	Alcohols, ethers, ketones	Miscible

ETHOCEL CONTAINER

DEVELOPED by the Dow Chemical Co., Midland, Mich., for packaging silicone sealing compound, a spirally-wound ethocel container provides the right combination of physical, chemical, and mechanical characteristics required for this service. Designed as a cartridge for a special gun, ethocel fills the need for a strong, rigid, transparent container which gives full protection, is shockproof at low temperature, and contains no plasticizer which might contaminate the compound. An important feature of this package is dimensional stability which is required so that the cartridge will maintain a precision fit when placed in the gun.

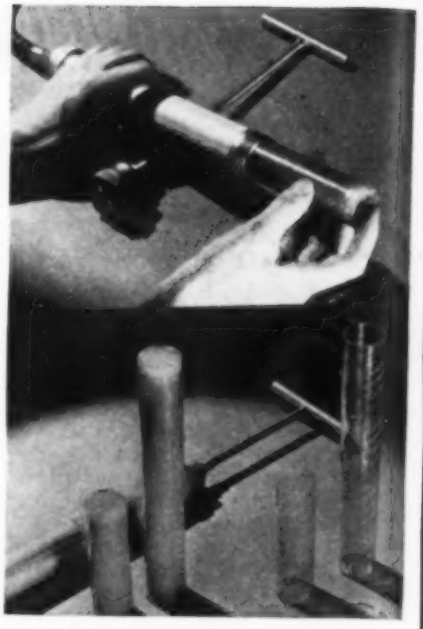
COATING RESINS

SEVERAL new products have been announced by the Reichhold Chemicals, Inc., Detroit, Mich. These include (1) No. 2100 Super-Beckacite a pure phenolic resin, new in formula, properties and said to cost less, work faster, yield higher viscosity, and to dry quicker than any pre-war pure phenolic. It is used for high-grade enamels and spar varnishes. (2) No. 1337 Beckosol. This is a pure alkyd modified with a pure phenol, for car and truck refinishing. It is said to be fast drying with high water spotting resistance, together with good durability. (3) No. 1338 Beckosol is an alkyd hardener which speeds drying and hardening of air-dried products when used in quantities of 1 to 5 percent. (4) No. 1339 Beckosol is a pure alkyd, white brushing vehicle for products where a maximum gloss-retention plus good initial color and color retention is desired. It is non-sagging and will dry hard over night with good water resistance. (5) No 1495 Beckosol solution is a non-phthalic alkyd producing a durable film. It dries fast to give a hard coating with good water and alkali resistance. It is designed for use in exterior enamels, porch and deck paints, industrial machinery enamels, etc.

SYNTHETIC RUBBER

ALREADY being produced in commercial quantity by the American Wagum Rubber Co., Atlanta, Ga., a new synthetic rubber under the brand name of Wagum is said to have a number of unusual properties. It is made by polymerizing butadiene and styrene with an organic sulphide produced from raw materials available in the state of Georgia.

This new synthetic rubber is a stable thermosetting product resembling crude



Ethocel cartridge for silicones

rubber in appearance and weight and is exceedingly resistant to oil, greases, solvents and sunlight. It is quickly softened on a mill and takes up compounding materials readily, and cures at approximately the same speed as similar natural rubber compounds. At ordinary temperatures the physical properties of this material are in the same range as those of buna-S, while at elevated temperatures and after aging it is said to be superior to other synthetic rubbers. Wagum is said to be a complete synthetic rubber in itself, requiring the addition of no other natural or synthetic rubber to produce high quality rubber goods. Its chief use so far has been in production of camelback for use in recapping tires. Tests have shown that it is superior to other rubbers for this purpose. To date, however, its full usefulness has not been explored due to lack of manpower for this work.

PROTECTIVE COVERING

APPLIED by means of brushing, dipping, or spraying, Plastipeel is a cold-pour vinyl-base compound now available as a protective covering to prevent scratches, mars and corrosion on metals such as steel, aluminum and magnesium. Produced by Duomite Plastic Industries, Culver City, Calif., it provides a transparent coating and forms a film from 0.003 to 0.005 in. thick. The film is flexible and is not disturbed if the material it covers is bent to different shapes and while it can be readily peeled off with the finger nail, it can be secured with heat so that it must be removed with solvent. While it has been principally used in the coating of metals, it may also be used to protect china, glassware, and other products with glazed or polished surfaces.

CANNED HYDROGEN

DEVELOPED during the war to take the place of heavy hydrogen cylinders which could not be transported through jungles and difficult terrain, calcium hydride pro-

MONSANTO'S THIOUREA

an intermediate that can be used in a variety of products

Thiourea, also known as thiocarbamide, sulfocarbamide and sulfourea, is a versatile chemical. It is used as an intermediate in resin compositions, pharmaceuticals and in the synthesis of thioglycolic acid. It is suggested as an additive in the production of glues to prevent gelling. Thiourea may also find application in dyes and fungicidal compositions.

Your own experimentation may uncover new uses for Thiourea. For a sample and technical data, please contact the nearest Monsanto office or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Mo.

District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

THIOUREA

$NH_2CS.NH_2$ Mol. Wt. 76.12

Standard Form: Crystals

Specifications: White, free-flowing crystals; moisture 0.50% max.; ash 0.05% max.; solution (10% water at 25°C) turbid

SOME OF THE MORE IMPORTANT MONSANTO INTERMEDIATES

Benzenesulfonic Acid 70-71%
Benzyl Chloride
Cyclohexylamine
2:5 Dichloraniline
Dichlorphenol and other Chlorphenols
Dicyclohexylamine
Dinitrochlorbenzene and other Nitrochlorbenzenes
Ortho-Aminobiphenyl Tech.
Orthochloranilines and other Chloranilines
Orthonitraniline and other Nitranilines
Phenol
Phosphorus Oxychloride
Phosphorus Trichloride
Salicylic Acid Tech.
Toluenesulfonic Acid 94%

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

vided a ready source of hydrogen in small quantities. Used during the war for installation of meteorological balloons, this material was packed in quantities to produce 6 to 24 cu. ft. of hydrogen gas.

Calcium hydride in small tin containers can be preserved indefinitely. When hydrogen is needed, a few holes are punched in the top of the cans and the whole submerged in water. Hydrogen may then be collected in a rubber envelope as it is released. This then acts as a simple gasometer to supply hydrogen at a fixed pressure at any desired rate. Canned hydrogen is ideal for laboratory operations when it can be conveniently stored on the stockroom shelves. It is now produced on a large scale by Metal Hydrides, Inc., Beverly, Mass. and is available in small packages or in bulk quantities.

NYLON RODS

Special military applications brought about the manufacture of nylon rods. These rods, molded from FM-1 nylon by Atlantic Plastics, Inc., Reading, Pa., are said to offer interesting commercial possibilities for sample and short production runs where the machining of solid bars offer economic advantages over molding. This material has a melting point of 505 deg. F., and has a high heat resistance together with high strength and toughness and good machinability. It is expected to have wide use in fabricating of wear resisting parts such as cams, gears, bearings, and other similar articles. FM-1 nylon rods are available in diameters ranging from ¾ in. to 1¾ in. and in lengths from 24 in. to 36 in.

AIRCRAFT LACQUER

Improved safety in airplane operation by reducing fire hazards of lacquered surfaces may now be obtained by using Skylac, a new lacquer manufactured by the Monsanto Chemical Co., St. Louis, Mo. This new finish was developed for use on fabric covered, exterior control and plane surfaces and on interior decorated areas. It combines increased weather resistance, high tautening effects, and ease of application with high fire resistance. When exposed to flames Skylac will not support combustion. It may be sprayed on at room temperature and because of its high solid content fewer coats are required. This material is expected to find wide use on all parts of the planes that are covered with fabric. It is now available in commercial quantities.

THERMOPLASTIC SEALING COMPOUND

Ethyl cellulose is the basic raw material used in the thermoplastic sealing compound, Cliderite, which was developed during the war by the Ernst Bischoff Co., New York, N. Y. This material has been used to seal condensers and rectifiers from moisture and the outside of batteries from acid leakage. Perhaps its most important wartime use was in the manufacture of radio proximity fuses for gun projectiles, under a U. S. Navy procurement program. The characteristics of this plastic completely fitted it for the requirements of application to this fuse. This new plastic material passed shock tests at 24,000 times the force of gravity and was impermeable to moisture and concentrated acids and alkalis; it formed an indestructible bond to the many types of plastics and metals used in the fuse.

Cliderite may be used as a cushion material which remains tough and durable at temperatures above 200 deg. F. and below 0 deg. F. It is suggested that a possible use is for interior linings as protection against alkalis and highly concentrated acids.

CLEANING SOLVENT

Developed for use in cold tank immersion cleaning of pistons, fuel pumps, carburetors, etc., a self-sealing compound, Fuzee is now available for civilian use. This material quickly and thoroughly removes carbon and varnish and other adhesive dirt, but utilizes a special compound on its surface which eliminates a large proportion of the flammable and obnoxious fumes ordinarily given off from these solvents. The manufacturer, Turco Products, Inc., Los Angeles, Calif., also has available a special dip tank container which may be used for cleaning small parts.

FLEXIBLE COATING

First vinyl resins used for waterproofing army ponchos and other apparel were unsatisfactory for use in low-temperature climates since they became stiff and inflexible in this kind of service. A vinyl butyral compound, DB 218, was developed for coating fabrics that must remain flexible at temperatures lower than 0 deg. F. This new coating material, manufactured by the Monsanto Chemical Co., St. Louis, Mo., is said to combine the advantages of vinyl materials with full flexibility and to have a number of advantages over all other types of coatings for this service.

ORGANIC SOLVENTS

An organic solvent dissolving many types of resins, both natural and synthetic is now available in limited quantities for research and development purposes from E. I. du Pont de Nemours & Co., Wilmington, Del. This compound, tetrahydrofuran (tetramethylene oxide) has chemical reactions similar to those of an aliphatic ether modified by its cyclic nature. Among its reactions are dehydration to butadiene, oxidation to maleic acids, conversion to halohydrins or dihalides, and reaction with ammonia to form pyrrolidine or with hydrogen sulphide to form tetrahydrothiophene. It can be chlorinated readily. Tetrahydrofuran will dissolve various substances such as rubber, vinyl polymers and copolymers, polyvinyl chloride, resins of all kinds and drying oils. Major properties are listed in the accompanying table:

Appearance	Colorless mobile liquid
Odor	Ether-like
Molecular weight	72.06
Melting point, deg. F	85
Boiling point, deg. F. at 760 mm.	150.8
Specific gravity, 20/4 deg. C.	0.888
Refractive index, n 20/D	1.4074
Flash point, deg. F.	Below 80
Solubility	Miscible in all proportions with water and most organic solvents.

REMOVABLE PROTECTIVE FILM

One of the several removable films developed during the war, Dipwrap is an organic plastic material which gives complete protection against corrosion and rough handling and is used in packaging of machine parts and tools for shipment and storage. This material produced by Paisley Products, Inc., Chicago, Ill. is quickly and easily applied by dipping the object to be protected into a container of melted Dipwrap, allowing it to cool for 5 or 10 sec., after which it is ready for shipment or storage. The resilient coating of Dipwrap provides a shock-resistant cushion which reduces surface damage to highly machined parts when subject to impact. It is also useful in protecting sharp cutting edges on spindles, cutters, millers, drills and other machine tools in shipment or in stock. While it does not soften until it reaches 250 deg. F., it will not rupture even with temperature variations between 150 deg. F. and —30 deg. F.

The film is easily removed when the part is required for use. Small parts are usually dipped with an impregnated non-wicking string in the film which serves as a ripcord to start the initial peeling. Large parts may be stripped by splitting the coating with a sharp knife.

Appearance	Amber to light brown translucent, plastic solid
Fire point, deg. F.	450
Average film thickness dipped at 375 deg F., in.	0.098±0.008
Tensile strength, lb. per sq. in.	525
Elongation, percent	72
Loss of liquid or volatile constituents, percent	5.9
Plasticity, in.	0.162
Softening point, deg. F.	250-270
Dipping temperatures, deg. F.	375-390

TETRAMETHYLENE CHLORIDE

Commercial development of organic syntheses that have hitherto been too costly to be of practical importance may be possible by the use of 1,4-dichlorobutane (tetramethylene chloride) now being manufactured by E. I. du Pont de Nemours & Co., Wilmington, Del. The two chlorine atoms of this compound are highly reactive, resembling those of benzyl chloride and allyl chloride. Either one or both of them may be replaced by sulphur, cyanogen, amine, alkoxy, aryloxy and other groups. Its diversity of reactions which includes many others not mentioned should make it an exceptionally valuable intermediate organic. Major properties are listed in the accompanying table. It is available at the present time in limited quantities for research and development purposes only.

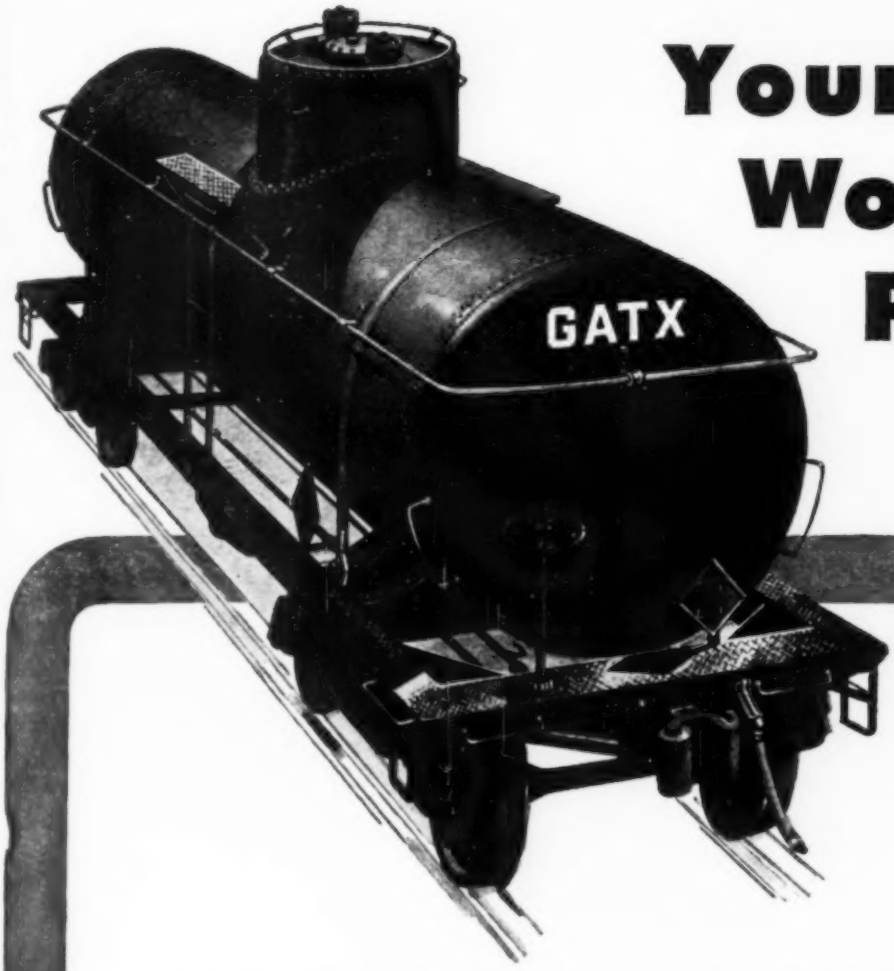
Appearance	Colorless, mobile liquid
Odor	Mild, pleasant
Molecular weight	127.02
Boiling point, deg. F. at 760 mm.	311
Flash point, deg. F.	140
Specific gravity, 20/4 deg. C.	1.141
Index of refraction, n 20/D	1.4542
Solubility	Insoluble in water; soluble in most common organic solvents.

DEODORANTS

Designated as Neutroscents, a new group of aromatic compounds have been developed to neutralize offensive odors and to substitute refreshing scents in contaminated atmospheres.

Neutroscents may be applied by spraying devices, by aerating and air conditioning units, and other dispersion and evaporation devices. Typical applications might include hospitals, sick rooms, theatres, smoking rooms, kitchens, restaurants, con-

Your Working Partner



Here's how General American tank cars go to work for men at the top:

First, they save you money, bringing raw liquid products to your plant in the most economical way. Many General American cars, specially designed, make possible money-saving bulk shipment for hard-to-handle acids, alkalies, gases.

Second, they maintain your quality reputation. They have the special features needed to guard against chemical or physical change in your finished product.

For Your New Products

General American research engineers are ready now—to design the specialized tank cars that will carry your products to market safely, surely, and at low cost.

GATX GENERAL AMERICAN

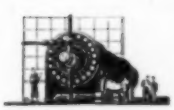
GENERAL AMERICAN TRANSPORTATION

CORPORATION

CHICAGO

Builders and Operators of Specialized Railroad Freight Cars

Bulk Liquid Storage Terminals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Pressure Vessels and ...er Welded Equipment

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WELDCO
CORROSION RESISTING TUBING

One length or a million

The Youngstown Welding & Engineering Company makes welded tubing of the proper type material to best withstand your corrosion conditions. It is available in odd or standard sizes, in limited quantities or carload lots. It will meet your requirements for pressure and uniformity. Special equipment with low setup charges permits production of special tubing for individual needs at a practical cost.

FITTINGS AND FABRICATED PIPING

A complete line of Weldco fittings is available. Weldco's well-equipped plant is in position to fabricate the entire pipe assembly you require.

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SEND FOR LITERATURE

Specialists in Corrosion Resistance

vention halls, institutions, etc. These compounds are available in several odors and in three different forms namely, concentrated, water soluble and solubilized from Fritsche Brothers, Inc., New York.

SYNTHETIC WAX

Possessing special plasticizing properties as well as being water repellant, a new white, odorless, crystalline, synthetic wax is now offered by the Mallinckrodt Chemical Works, St. Louis, Mo. Said to have promising possibilities in cosmetics, water repellant compositions, film modifiers, and in plasticizers, this material, dicetyl carbonate, has the following principal properties:

Formula	$(C_{16}H_{33})_2CO_3$
Molecular weight	510.5
Melting point, deg. C.	44-46

Dicetyl carbonate is now available in experimental quantities.

CORROSION-RESISTANT COATINGS

A new series of protective coatings manufactured by Protective Coatings, Inc., Detroit, Mich., include 12 or more formulations designed to meet a wide range of industrial needs. Identified as the Alkacite series, the coatings are said to effectively prevent moisture penetration and acid reaction. Tests have been made which demonstrate that surface penetration of Alkacite will resist corrosion successfully after the film has been scraped from the metal.

The coatings will not crack, check, loosen or scale and, according to the manufacturer's claim, they meet all standard tests for resistance to moisture, weathering, acid and alkali penetration and deterioration and are unaffected by temperature changes from sub zero to 180 deg. F. Alkacite coatings are designed for application to any porous surface such as metals, wood or concrete for the protection of plant structures and equipment, tanks, bridges, tunnels, pipe lines, etc. Depending on the particular formulation, the coverage of this material may vary from 600 to 1,200 sq. ft. to the gallon.

Included in this series of coatings now available are (1) Alkacite 101—a high solid sprayable base, prime or finish coat, glossy black in color. It is best used for protection of structural steel, fume ducts, etc.; (2) Alkacite 102—a glossy black general use formulation; (3) Alkacite brushing mastic—for use as tank linings for water or acid and alkali solutions; (4) Alkacite 103—a sprayable aluminum coating. Marine copper for ship bottoms, red oxide primer, and other similar coatings will be included in this series.

FIBERGLAS BANDAGE

A newly developed flexible bandage made of Fiberglas supplied by the Owens-Corning Fiberglas Corp., Toledo, Ohio, is said to provide greater comfort and freedom of movement for those suffering from fractures or other similar injuries. The Fiberglas-plastic cast is said to weigh only one-fourth to one-sixth as much as an equivalent plaster cast and does not block X-ray penetration. This cast is immersed in a setting solution just before it is applied, causing the bandage to harden into a rigid cast.

Hooker Acid Chlorides Meet a Wide Range of Needs

WHILE the Hooker chemicals listed below are all acid chlorides, their properties and characteristics are such that among them you will find chlorinating agents and intermediates for the manufacture of dyestuffs, plasticizers, and a wide variety of other organic compounds. Whether you work with soaps or dyes, with pharmaceuticals or lubricants, if you use chemicals, some of the acid chlorides may make your work easier.

Brief descriptions and some of the uses of these acid chlorides are given below. Technical Data Sheets and samples will be furnished when requested on your letterhead. For more information consult our Technical Staff for help on how Hooker Chemicals can solve your specific problems.

HOOKER RESEARCH *Presents*

TETRAHYDROFURFURYL OLEATE

$CH_3(CH_2)_7CH{:}CH(CH_2)_7COOCH_2OC_4H_7$

Here is a recently developed Furfural derivative that is winning a place for itself in the plastics field. Chemists working with plastics will find this Hooker chemical an excellent plasticizer for imparting flexibility at low temperatures to polyvinyl chloride. It is also used as a plasticizer with other film-forming materials. It is a yellow to light brown oily liquid. Boiling range at 16 mm is 200° to 285°C. It is insoluble in water, soluble in alcohols, esters, ketones, hydrocarbons and chlorinated solvents. Tetrahydrofurfuryl Oleate is now available in commercial quantities. Samples and Technical Data Sheet 343 will be furnished gladly when requested on your letterhead.

PRODUCT *Chemical Formula and Molecular Weight*	DESCRIPTION & USES
Acetyl Chloride CH_3COCl; 78.5	Clear, colorless to pale yellow liquid. B. R. 5° incl. 51°C. To introduce acetyl group into organic compounds. Manufacture of intermediates, dyes, and pharmaceuticals. Reagent in manufacture of sulfonated fatty bodies.
Benzoyl Chloride C_6H_5COCl; 140.5	Clear, colorless liquid. Boiling point 198°C. To introduce benzoyl group into organic compounds. Manufacture of benzoyl peroxide, benzophenone, benzyl benzoates, synthetic perfumes, dyes, pharmaceuticals.
Carbonyl Chloride (Phosgene) $COCl_2$; 98.9	Liquified gas. F. P. -126°C. B. P. 8.2°C. Manufacture alkyl and aryl chlorocarbonates and dicarbonates; Michler's ketone; dye intermediates; metal chlorides and anhydrides; pharmaceuticals; perfumes.
Metanitrobenzoyl Chloride $C_6H_4NO_2COCl$; 185.5	Yellow to brown liquid partially crystallized at room temperature. Last crystal point 28° to 31°C. Manufacture of dyes for fabrics and color photography; pharmaceuticals.
Paranitrobenzoyl Chloride $C_6H_4NO_2COCl$; 185.5	Yellow crystalline solid. M. P. 70°C minimum. Manufacture of novocaine; dyes.
Sulfuryl Chloride SO_2Cl_2; 135.0	Light yellow liquid. B. R. 2° incl. 69.1°C. Reacts with organic acids to form other chlorides and anhydrides. Chlorinating agent to produce chlorphenol and other chlorination reactions in organic synthesis.
Thionyl Chloride $SOCl_2$; 119.0	Clear, yellow to red liquid. B. R., refined grade, 75° to 78°C. Manufacture organic and chlorides and anhydrides, alkyl chlorides from corresponding alcohols.

Butyryl Chloride — **Caprylyl Chloride**
Propionyl Chloride — **Pelargonyl Chloride**

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Niagara Falls, N. Y.

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HOOKER CHEMICALS

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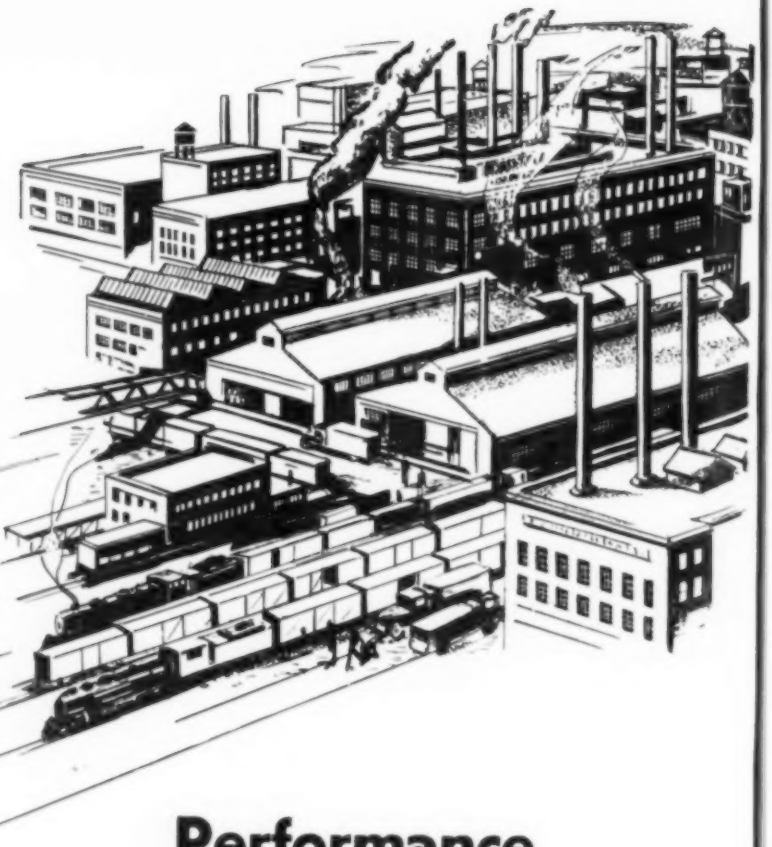
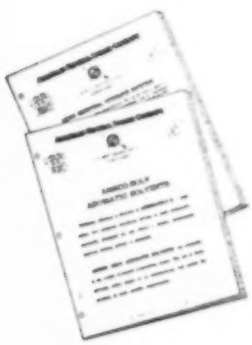
Caustic Soda — **Muriatic Acid** — **Sodium Sulfide**
Paradichlorbenzene — **Chlorine** — **Sodium Sulfhydrate**



Performance Proved!

Unlimited applications in industry . . . some classified as "standard"—others as "special" . . . are daily proving the performance of Amsco Industrial Petroleum Solvents.

Amsco's constant laboratory and field research . . . modern production facilities . . . and "in-your-plant" technical service are ready to assist you in finding ways to gain product improvement while effecting new economies in production. Simply write!



Specification characteristics of Amsco Industrial Petroleum Naphthas and Amsco-Solv Aromatic Solvents are given in two folders . . . send for them today!

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for every industrial use—

- Amsco-Solv Aromatic Solvents
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- Amsco Rubber Solvents
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and other special specification solvents manufactured to meet specific requirements.

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CHEMICAL ENGINEERING NEWS

ROSTER OF TECHNICAL INVESTIGATORS WHO VISITED EUROPEAN COUNTRIES ON THC MISSIONS

EARLIER RELEASES have given a partial record of the personnel of American scientists, engineers, and other technical men who, under the direction of the Joint Chiefs of Staff went to Europe to investigate technical industrial war developments. This list has been brought up to date by the inclusion of the names, addresses and business or other affiliations of civilian technical investigators and military personnel of the missions sponsored by the Technical Industrial Intellegence Committee who were overseas or had returned as of September 30. The list is quite extensive with the names separated under 20 general groupings according to the nature of the individual investigations. Among the chemical process groups, the following are listed under chemicals, liquid fuels and lubricants, and rubber:

CHEMICALS

Verne C. Bidlack, assistant to the president, McCloskey Varnish Co., Philadelphia; Ray H. Boundy, assistant to the president, Dow Chemical Co., Midland, Mich. Clyde A. Crowley, chairman, Graham, Crowley & Associates, Inc., Chicago; Harry A. Curtis, dean, College of Engineering, University of Missouri, Columbia, Mo.; Zola G. Deutsch, Deutsch and Loonam, New York; Nathaniel M. Elias, laboratory and consulting work, New York; R. Leonard Hasche, scientific consultant, Tennessee Eastman Corp., Kingsport, Tenn.; Lowell B. Kilgore, director of research, Kilgore Development Corp., Washington, D.C.; Sidney D. Kirkpatrick, editor, *Chemical & Metallurgical Engineering*, New York; Norman W. Krase, E. I. du Pont de Nemours & Co., London, England; Arthur Lyem, superintendent in charge of special production, Celanese Corp. of America, Cumberland, Md.; Walter J. Murphy, editor, *Industrial & Engineering Chemistry*, Washington D.C.; Joseph Neubauer, superintendent, chlorine-caustic soda plant, Pittsburgh Plate Glass Co., New Martinsville, W. Va.; Thomas S. Nichols vice president, Prior Chemical Corp., New York; Edmond O. Rhodes, manager of development, The Koppers Co., Inc., Pittsburgh; Sherlock Swann, Jr., research professor of chemical engineering, University of Illinois, Urbana, Ill.; Stephen L. Tyler, secretary and executive secretary, American Institute of Chemical Engineers, New York; Benton H. Wilcoxon, consulting chemical engineer, Washington, D.C.; John P. Wilkins, assistant professor, School of Chemistry and Physics, Pennsylvania State College, State College, Pa.

LIQUID FUELS AND LUBRICANTS

John G. Allen, process engineer, Phillips Petroleum Co., Bartlesville, Okla.; Harold V. Atwell, research supervisor, The Texas Co., Beacon, N. Y.; E. L. Baldeschweiler, chemist, Standard Oil Development Co.; Bayway, N. J.; George S. Bays, assistant superintendent, Baytown Ordnance Works, Humble Oil & Refining Co., Baytown, Texas; Leonard E. Carlsmith, chemical engineer, Standard Oil Co. of Louisiana, Baton Rouge, La.; Ernest Cotton, chemical engineer, Gulf Oil Corp., Pittsburgh; L. P. Evans, chemical engineer, Socony Vacuum Oil Co., research and development laboratories, Paulsboro, N. J.; Warren F. Faragher, process engineer, Houdry Process Co., Linwood, Pa.; Donald S. Fraser, chief of technical section, foreign refining division, Petroleum Administration for War, Washington, D.C.; Vladimir Haensel, research chemist, Universal Oil Products Co., Riverside, Ill.; Lester L. Hirst, chemist, Bureau of Mines, Pittsburgh; William A. Horne, assistant head of petroleum processes section, Gulf Research & Development Co., Pittsburgh; Irvin H. Jones, chemist, The Koppers Co., Pittsburgh; Jean P. Jones, chemist and attorney, patent department, Phillips Petroleum Co., Bartlesville, Okla.; Paul K. Kuhne, assistant to general manager, Gulf Oil Corp., Pittsburgh; Byron L. Mackusick, gas engineer, The Pure Oil Co., Northfield, Ill.; M. R. Mandelbaum, chemist and lawyer, Kenyon & Kenyon, New York; Louis L. Newman, gas engineer, Bureau of Mines, Washington, D.C.; William W. Odell, chemical engineer, Bureau of Mines, Washington, D. C. Alfred R. Powell, assistant director of research, The Koppers Co., Pittsburgh; Hans Schindler, senior research chemist, development laboratories, The Pure Oil Co., Winnetka, Ill. Wilburn C. Schroeder, acting chief, Office of Synthetic Liquid Fuels, Bureau of Mines, Washington, D.C.; Guenther Von Elbe, physical chemist, Bureau of Mines, Pittsburgh; Ernst F. Voss, chief engineer, Humble Oil & Refining Co., Houston, Tex.; Horace M. Weir, chemical engineer and consultant, M. W. Kellogg Co., Wynnewood, Pa.

RUBBER

Jean D. Fennebresque, assistant to the vice president in charge of development and production, Celanese Corp. of America, New York; Benjamin S. Garvey, Jr., technical manager, synthetic rubber, B. F. Goodrich Chemical Co., Akron, Ohio; Ernest T. Handley, manager, The Firestone Tire & Rubber Co., Akron, Ohio; Russell Hopkinson, technical advisor, United States Rubber Co., New York; Robert D. Juve, research chemist, The Goodyear Tire & Rubber Co., Akron, Ohio; John W. Livingston, vice president in charge of production, research and development, Rubber Reserve Co., Washington, D. C.; Carl C. Monrad, professor of chemical engineering, Carnegie Institute of Technology, Pittsburgh; Arthur H. Nellen, chief chemist and development manager, Lee Tire & Rubber Co., Conshohocken, Pa.; Rudolph A. Schatzel, director of research, General Cable Corp., Bayonne, N. J.; James E. Troyan, supervisor of polymerization pilot plant, Phillips Petroleum Co., Phillips, Texas; William L. White, director of research, The Manhattan Rubber Mfg. Division of New Jersey, Raybestos-Manhattan Inc., Passaic, N. J.

CHEMICAL ENGINEERS WILL MEET IN CHICAGO

ARRANGEMENTS have been practically completed for holding the 38th annual meeting of the American Institute of Chemical Engineers. While some late changes are possible, the program for the different sessions has been drawn up under the direction of R. C. Kintner, general chairman. The meeting will be held in Chicago on December 17-19 with the Stevens Hotel as headquarters. In addition to its other duties, the local committee has endeavored to reserve hotel rooms for visiting members who have made this request. The committee further has emphasized the importance of making early reservations and warns that out of town members should not plan to attend the meeting unless they have confirmed room reservations.

The meeting will open on the morning of December 17 with a welcome from the Chicago section. Papers scheduled include: "The Liquid Phase Isomerization of Normal Paraffins Using a Fluid Salt Catalyst," S. H. McAllister, Shell Development Co.; "Present-Day Methods of Manufacturing Hydrogen," R. M. Reed, The Girdler Corp.; "The Dow Process for Styrene Production," J. E. Mitchell, Jr., Dow Chemical Co. The program calls for the completion of these papers by 11 o'clock when the annual business meeting will get under way.

Plant visits are arranged for the afternoon but since there is room for only about one-half of the expected attendance in the plant inspection trips, a symposium on dust removal will be presented. Speakers will be C. E. Beaver, Research Corp., on "Cottrell Electrical Precipitation Equipment in Chemical Fields"; D. P. Graham, Peabody Engineering Corp., on "The Use of Perforated Plates on Dust Removal"; J. A. Messenger, Buell Engineering Corp., on "Cyclones"; L. M. Briggs, Western Precipitation Corp., on "Dust Analysis."

The morning of December 18 also will be given over to the presentation of technical papers including: "Butadiene Extraction" by Standard Oil Development Co., authors not yet named; "Experiences in Commercial Application of the Hydrogen Fluoride Alkylation Process," E. M. Skinner, Socony-Vacuum Oil Co.; "Low Temperature Processing of Gas," A. W. Pratt, Stone & Webster Engineering Corp.;

LIQUID OR GAS TEMPERATURE CONTROL PROBLEM?

These publications describe the NIAGARA AERO HEAT EXCHANGER and some of its applications. It accurately regulates the temperature of gases and liquids. Industrial plants using chemical and heat-treating processes have gained extra benefits from using this equipment wherever cooling water is used or any fluid is cooled to exact temperatures.

Some of the applications are: controlling temperature of liquid chemicals and intermediates in process; controlling jacket water temperature in power and process equipment; regulating the temperature of controlled atmosphere; controlling liquid bath temperatures.

As a cooler, the NIAGARA AERO HEAT EXCHANGER saves the cost of 95% of the water circulated.

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INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

"Process Design of Catalytic Reaction—Dehydrogenation of Butane," R. H. Dodd and K. M. Watson, University of Wisconsin.

Two plant inspection trips are planned for the afternoon but a technical session will be available for those who do not take the trips.

The session on December 19 will open with a paper on "Glass" by J. R. Blizard, Corning Glass Works. Other papers scheduled are "Karbate," M. R. Hatfield and C. M. Ford, National Carbon Co.; "Silicones," W. R. Collings, Dow-Corning; "Synthetic Rubber and Plastics," M. G. Fontana, E. I. du Pont de Nemours & Co.; "Engineering Materials," Messrs. Slayter and Collins, Owens-Corning Fiberglas Corp. This session constitutes a symposium on materials of construction arranged by James A. Lee, *Chemical & Metallurgical Engineering*. The symposium on dust removal scheduled for December 17 was arranged by Walter Lobo.

STAUFFER EXPANDS OUTPUT AT LAS VEGAS PLANT

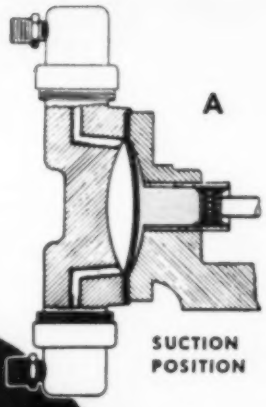
ANNOUNCEMENT of expansion of operations in the caustic soda and chlorine section of Las Vegas, Nevada, magnesium plant has been made by the Stauffer Chemical Co. Stauffer is operating the plant under lease from the Reconstruction Finance Corp. and is working with RFC for the industrial development of the Las Vegas area. Using only half the huge productive capacity of the facilities, Stauffer is offering other manufacturers an opportunity to establish branch factories at the location in a cooperative arrangement with RFC.

Scores of buildings, most of which are reinforced concrete and air-conditioned, are available at reasonable terms to manufacturers of chemical products. The location offers low-cost power, water, and nearby raw materials. In addition to the plant buildings, RFC has available a wide variety of processing equipment which can be leased under favorable terms.

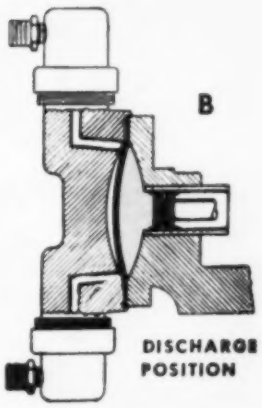
Operated by Basic Magnesium, Inc., the plant was closed following the cessation of hostilities in Europe. Later the chlorine-caustic soda units were taken over by Stauffer to assure supplies of these chemicals for war production to West Coast industries. Now the plant is producing alkalis and other chemicals for industries all over the country for postwar consumption. In addition to chlorine, caustic soda, anhydrous hydrochloric acid, aluminum chloride, and hydrogen, Stauffer soon will offer an extended list of other chemicals from the new plant.

PLASTICS GROUP FORMS NEW ENGLAND SECTION

MEMBERS of the Boston-Providence, Worcester-Leominster, Springfield-Hartford and Bridgeport-Waterbury Chapters of the Society of the Plastics Industry formally organized the New England Section of the Society at a meeting held in Manchester, Vt., on October 16-17. Officers chosen were G. Victor Sammett, president, Northern Industrial Chemical Co., chairman; Lionel



Exclusively in this proportioning pump, the piston reciprocates a liquid medium interposed between the diaphragm and piston. This causes the diaphragm to react positively to every change in piston position. Diaphragm-life, from a mechanical point of view, is infinite; and leak-likely packing glands *are no part of our construction!*



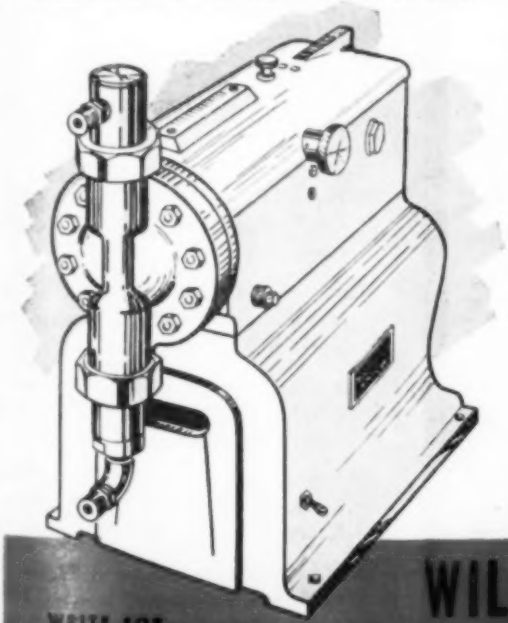
WILSON PULSAFEEDERS are known by the companies they keep in precision production

HYDRAULIC BALANCE

Assures accuracy and dependabilty to all Wilson Pulsafeeders regardless of capacity, pressure or nature of chemicals being pumped

Above diagram of suction and discharge position are exaggerated to indicate more clearly the principle of operation. Actually the diaphragm-travel is barely perceptible.

Wilson Pulsafeeders are made in both high and low pressure models, up to 20,000 pounds per square inch. Capacities range from a few c.c.p.h. to 1000 g.p.h. Accuracies up to ⅛ of 1% are obtainable where required. Models are available for the COMPRESSION OF GAS.



Persisting accuracy is the outstanding quality in Wilson Pulsafeeders. It is *the* reason why technicians all over the world so generally specify these chemical proportioning pumps for their new installations as well as for modernizing replacements.

Special significance lies in the fact that Wilson Pulsafeeders are chosen exclusively for so many remote placements where need for frequent servicing cannot be tolerated, and where results must satisfy despite the handicaps of distance, inexperienced personnel, make-shift power supply and comparable difficulties.

In Wilson Pulsafeeders, load liquids are isolated from working parts. Lubrication is sealed in. Valves are designed for specific service. Balanced diaphragms (see sketches above) assure accuracy and are not subject to rupture regardless of operating pressures. Micrometer adjustment of stroke, according to calibration charts furnished, may be made while Pulsafeeders are in operation.

May we send our general folder for your files or, better still, specific information as it may apply to an immediate problem? *We also manufacture liquid filling machines and dry chemical feeders.* Do write us today.

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PNEUMATIC "NULL" BALANCE

INSTRUMENTS

for measurement and transmission of

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LIQUID-LEVEL

SPECIFIC GRAVITY

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which shows these NULLMATIC circuits, and also describes the

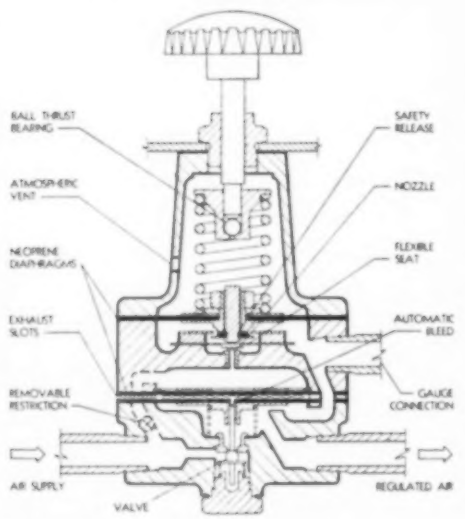
MOORE VALVE POSITIONER and the MOORE LIQUID-LEVEL CONTROLLER

(Packless Flexible Shaft Type)

THIS "NULL" SYSTEM IS EMPLOYED IN

THE NULLMATIC PRESSURE REGULATOR

— a pressure controller, which maintains the regulated pressure at the set value, *regardless of wide changes in flow or in supply pressure.*



APPLICATIONS—(1) For remote manual control of air-operated valves or air-loaded cylinders. A manual-automatic control panel, with by-pass, is available. (2) For general laboratory use. (3) In calibration departments, for setting and maintaining manometer readings. (4) Wherever precision regulation of air or gas pressure is required.

STANDARD RANGES

0 to 50" H_2O
0 to 15 p.s.i.
0 to 30 p.s.i.
10 to 50 p.s.i.
20 to 100 p.s.i.

Bulletin 402 shows graphs of performance data.

NULLMATIC Regulators can be furnished for **VACUUM APPLICATIONS**

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Kavanaugh, Standard Tool Co., vice chairman; A. A. Lawrence, Dow Chemical Co., secretary-treasurer; Directors for one year are Warren E. Hill, vice president, Prolon Plastics; H. H. Wanders, vice president Northern Industrial Chemical Co.; William Torres, Rohm & Haas Co.; Philip J. Graham, Worcester Molded Plastics Co. Directors for a two-year period are W. E. Milton, Jr., General Electric Co.; James S. Berthold, president, Bridgeport Molded Plastics Co.; Louis Levine, Commonwealth Plastics Co.; and Ralph H. Cutting, Keyes Fibre Co. Address of the secretary is Dow Chemical Co., Boston.

GAS ASSOCIATION ELECTS INDUSTRIAL OFFICERS

At the twenty-seventh annual meeting of the American Gas Association held in the Engineering Societies Bldg., New York on October 24-25, Harry A. Sutton, Public Service Electric & Gas Co., Newark, N. J., and Karl Emmerling, The East Ohio Gas Co., Cleveland, were elected chairman and vice chairman respectively of the industrial and commercial gas section of the Association. Mr. Sutton referred to the new and improved applications made as a result of research. Accomplishment in radiant tube heating, controlled atmospheres, bright annealing,

CONVENTION CALENDAR

Packaging Institute, Inc., seventh annual meeting, Hotel Commodore, New York, N. Y., November 26-27.

American Institute of Chemical Engineers, annual meeting, Stevens Hotel, Chicago, Ill., December 17-19.

American Association of Textile Chemists and Colorists, victory convention, Hotel Pennsylvania, New York, N. Y., January 3-5.

American Society for Metals, annual convention, Statler Hotel, Cleveland, Ohio, February 4-8.

Technical Association of the Pulp and Paper Industry, annual meeting, Hotel Commodore, New York, N. Y., February 24-30.

Exposition of Chemical Industries, 20th exposition, Grand Central Palace, New York, N. Y., February 25-March 1.

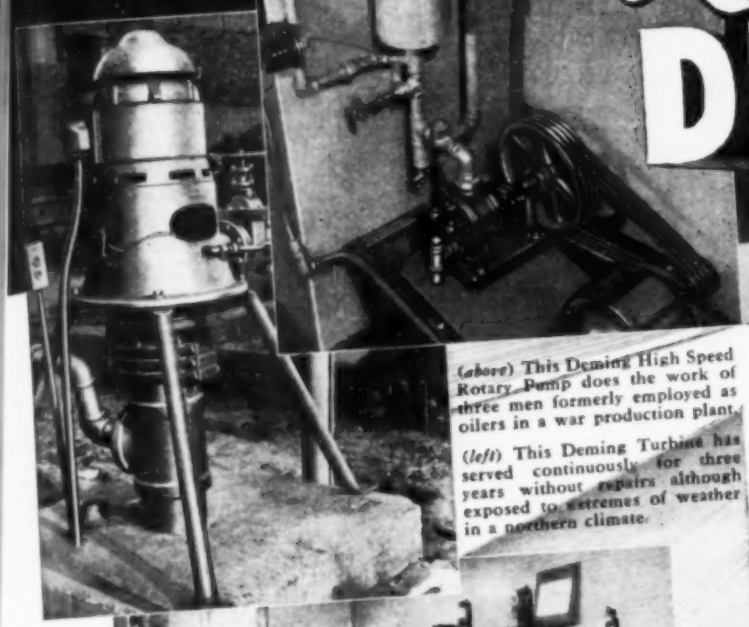
American Ceramic Society, 48th annual meeting, Hotel Statler, Buffalo, N. Y., April 28-May 1.

National Association of Corrosion Engineers, annual meeting, President Hotel, Kansas City, Mo., May 7-9.

Society for the Promotion of Engineering Education, 53rd annual meeting, Jefferson Hotel, St. Louis, Mo., June 20-23.

Fourth National Chemical Exposition, Chicago, Ill., September 10-14.

Look to DEMING

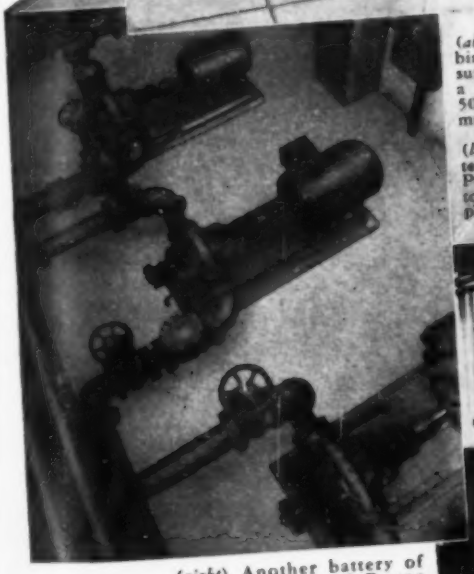


(*above*) This Deming High Speed Rotary Pump does the work of three men formerly employed as oilers in a war production plant.

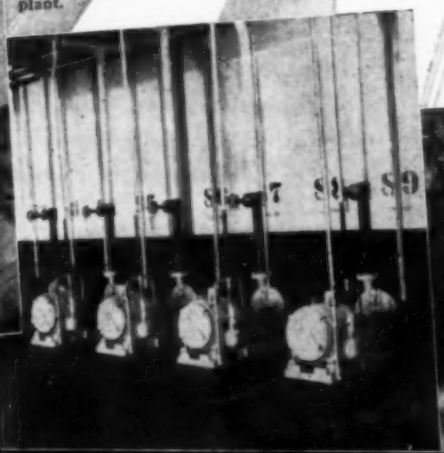
(*left*) This Deming Turbine has served continuously for three years without repairs although exposed to extremes of weather in a northern climate.

(*above*) This Deming Turbine pumps entire water supply for a large plant at a saving of approximately 50% compared with former municipal water rates.

(*left*) Partial view of a battery of Deming Centrifugal Pumps used for cooling tower service in a vital war plant.



(*right*) Another battery of Deming Centrifugal Pumps that have worked "around the clock" for several years without any major repairs.



(*below*) This Deming Centrifugal Pump has worked underground for several years without repairs although exposed constantly to dampness.

FOR DEPENDABLE PUMP PERFORMANCE

Best recommendation of any line of products serving industry is the war-time record that calls for continuous service under conditions of "wear and tear" never encountered in normal times.

Deming Pumps are proving by their actual performance records that high standards of engineering and manufacturing point up to peak efficiency and durability under "acid test" operating conditions.

If you have an immediate and essential pumping problem, Deming and the Deming Distributor in your area will make every effort to cooperate. Write THE DEMING COMPANY, SALEM, OHIO.

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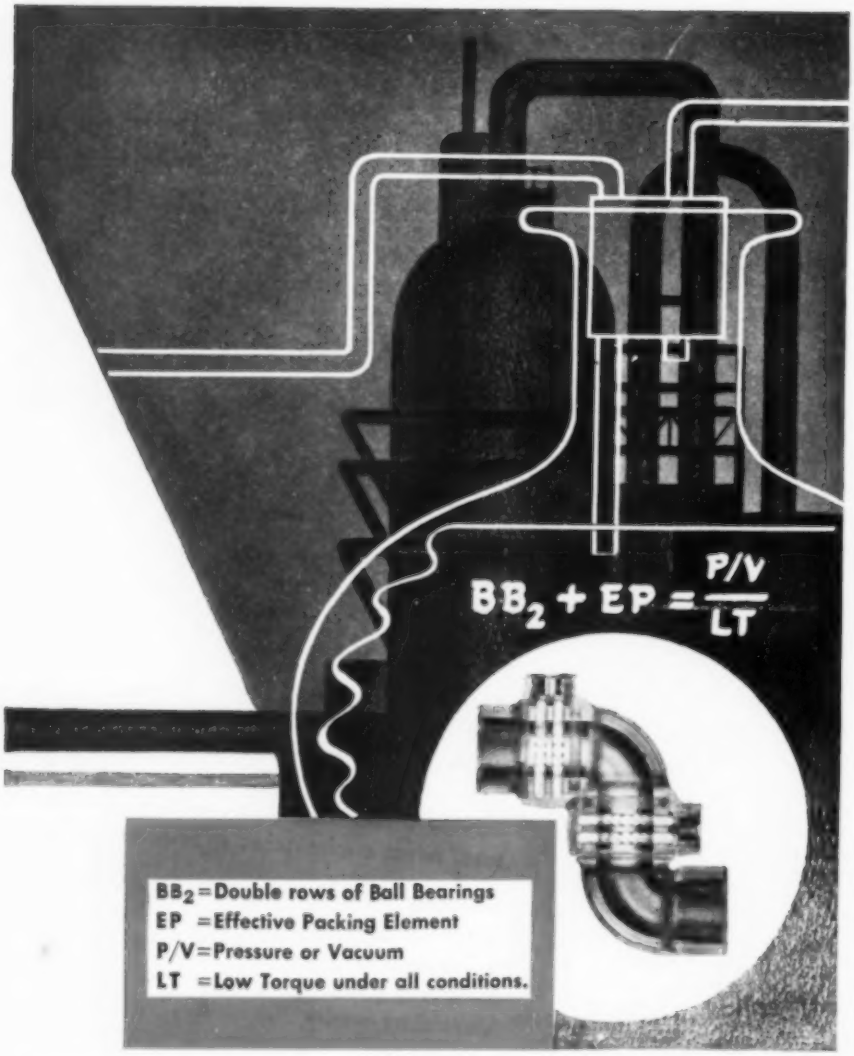
$BB_2 + EP = \frac{P/V}{LT}$
BB_2 = Double rows of Ball Bearings
EP = Effective Packing Element
P/V = Pressure or Vacuum
LT = Low Torque under all conditions.

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gas quenching recarbonization of "skin recovery," controlled heating and cooling, convection heating, immersion heating, radiant heating and gas pickling are a few of the many developments available for the postwar market.

CONSULTING CHEMISTS HOLD ANNUAL MEETING

At the annual meeting of the Association of Consulting Chemists & Chemical Engineers, Inc., held October 23 at the Architects' Club, New York, the newly elected officers and councilors of the Association were announced as follows: Albert Parsons Sachs, consulting chemical engineer, New York, president; Henry M. Shields, partner, Bull & Roberts, New York, vice president; Claude F. Davis, chief chemist, Schwarz Laboratories, New York, secretary; Sam Tour, Sam Tour & Co., Inc., New York, treasurer. The new councilors, with terms of three years, are Percy E. Landolt, chemical engineer, New York; Roger W. Truesdail, president, Truesdail Laboratories, Inc., Los Angeles; and John M. Weiss, John M. Weiss & Co., New York.

P. C. REILLY SCIENCE FUND FOR NOTRE DAME

Notre Dame University has announced a gift of $1,000,000 from Peter C. Reilly, president of Reilly Tar & Chemical Corp. and Republic Creosoting Co. of Indianapolis. The contribution, largest single gift in the history of the university, is to be known as the P. C. Reilly science fund, and will be an endowment.

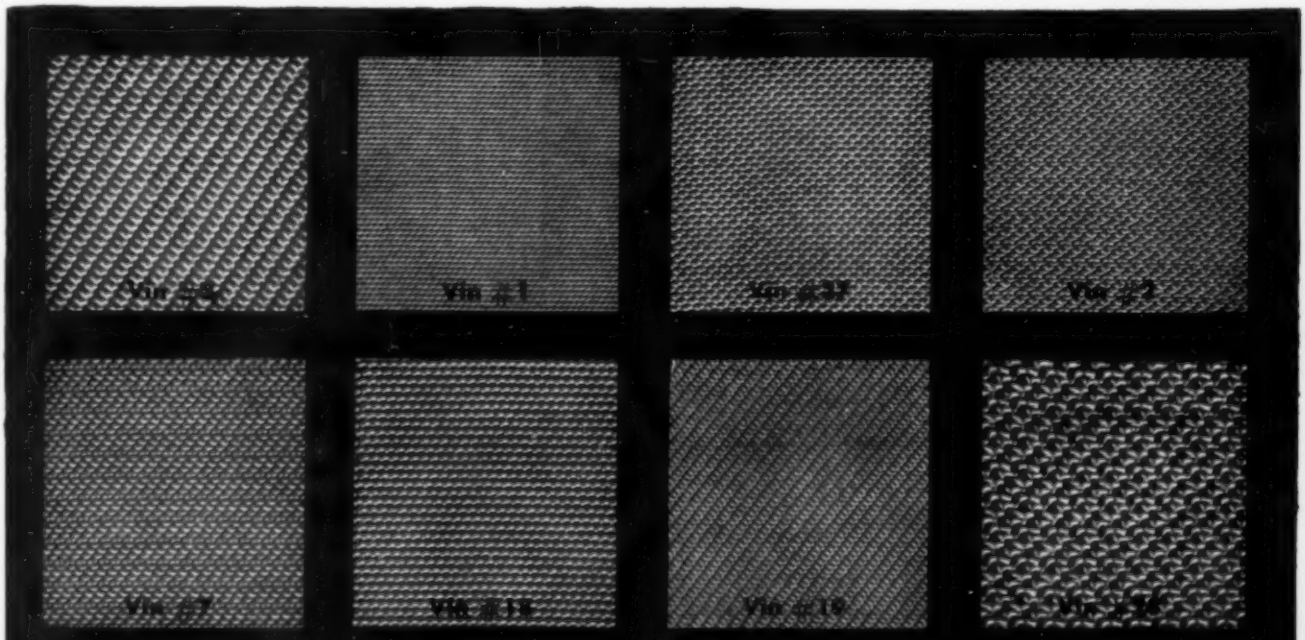
Mr. Reilly specified that the income from the endowment is to be used in the field of chemistry and chemical engineering. Awards specified include an annual fellowship to the outstanding lay members of the graduating class in chemistry or chemical engineering departments of Notre Dame; four annual graduate non-teaching fellowships of $1,000 each for graduates of chemistry or chemical engineering from Notre Dame or schools other than Notre Dame; and an honorarium of $5,000 annually to an outstanding chemist or chemical engineer for a one-semester series of lectures at the university.

At the end of eight years the number of annual graduate non-teaching fellowships is to be increased as the income from the fund increases. In the fiftieth year of he fund the income from the accumulated capital fund shall be divided equally, 50 percent to be used for fellowships and lectures and 50 percent to be added to the capital fund.

INTERNATIONAL MINERALS TO BUILD NEW AMINO PLANT

At the annual meeting of the corporation held last month, Louis Ware, president of International Minerals & Chemical Corp., announced that the company will build the country's largest amino products plant at San Jose, Calif. It will cost $2,500,000 and will double the company's present output of such products.

VINYON* FIBER



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If you have a filter fabric problem in connection with any of the processes or products listed below, Vinyon fiber filter fabrics may be the solution. Subject always to certain heat limitations, Vinyon is highly resistant to corrosive fluids.

Perfected and developed through careful field studies, Vinyon fiber filter fabrics are now solving many problems in the filtration of mineral acid and alkali solutions.

Longer life, higher efficiency and therefore ultimate economy are characteristic of Vinyon fiber filter fabrics that will be of interest to you. The engineers on our staff are in a position to discuss with you the possible application of Vinyon fabric to your particular problems. When writing please include all information regarding your present filtration process.

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- Pigments and Dry Colors
- Pharmaceuticals
- Metallurgical Processes
- Salt Solutions
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- Dyes and Intermediates
- Mineral Acid Solutions
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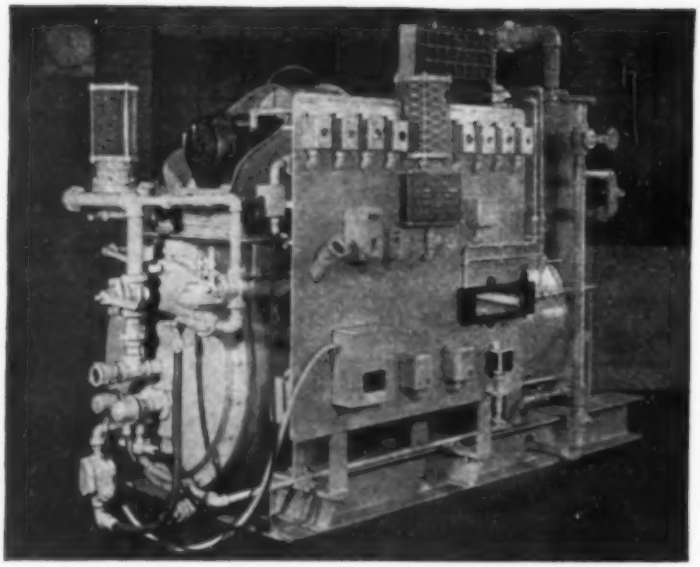

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A specially prepared BULLETIN No. F 901.4 *giving complete details of these unusually adaptable machines will be forwarded upon request.*

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Most important of these is mono sodium glutamate, a vegetable seasoning used to enhance the natural flavors of foods. The new plant is expected to be in full operation by the summer of 1946 and will be built so as to permit of expansion when consuming demands make it advisable. In addition to increased quantities of mono sodium glutamate, the new output will add subsequently to the company's products for pharmaceutical use, including glutamic acid, glutamic acid hydrochloride, betaine, betaine hydrochloride, leucine, iso-leucine, and tyrosine.

PULP WASTE DISPOSAL STUDY UNDER GENERAL COUNCIL

THE National Council for Stream Improvement (of the pulp, paper and paperboard industries) and the Sulphite Pulp Manufacturers' committee on waste disposal of Wisconsin have completed an agreement whereby the national group will take over the Wisconsin's group activities in the pulp and paper mill waste disposal field. The Wisconsin group has been engaged for the past six years in research activities centered at The Institute of Paper Chemistry in Appleton, Wis., to determine means of disposing of waste sulphite liquors in a manner consistent with the public interest. It also has carried on investigations in connection with the utilization of chemicals and other valuable materials which are discharged with the waste liquor. This work will continue at the Institute by the present personnel but will be supervised and financed by the National Council.

NEW YORK ALUMNI OF M.I.T. WILL HOLD BANQUET

THE Technology Club of New York will hold its annual all-technology alumni banquet in the Biltmore Hotel, New York, on the evening of December 5. The dinner is in honor of Dr. Karl T. Compton who is completing his fifteenth year as president of the Massachusetts Institute of Technology. Dr. Compton will be introduced by A. Warren Norton, president of the alumni association and by Bradley Dewey, president of the Dewey & Almy Chemical Co.

NATIONAL ROSTER OFFERS JOB PLACEMENT SERVICE

RETURNING veterans and displaced war workers who are scientifically and professionally qualified and who are seeking employment in industry, non-profit research institutions, colleges and universities, are offered the help and the extentive resources of the National Roster of Scientific and Specialized Personnel, 1006 U Street, N.W., Washington 25, D. C. Separation centers of the Armed Forces are cooperating with the National Roster. Return postcards and application and registration blanks are provided and each center will be supplied at least every two weeks with a current list of open positions. The placement section of the National Roster will send brief statements regarding applicants to employers who have

How many in YOUR BUSINESS?

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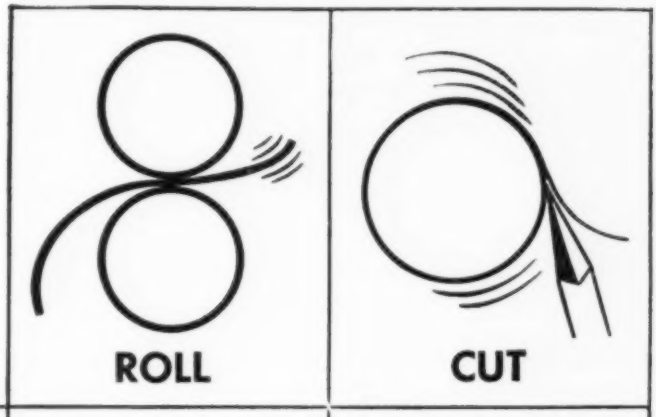

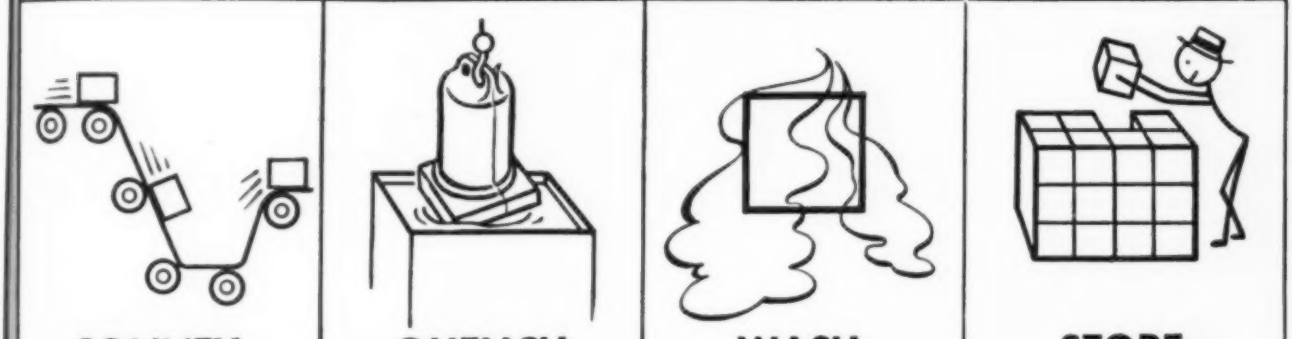

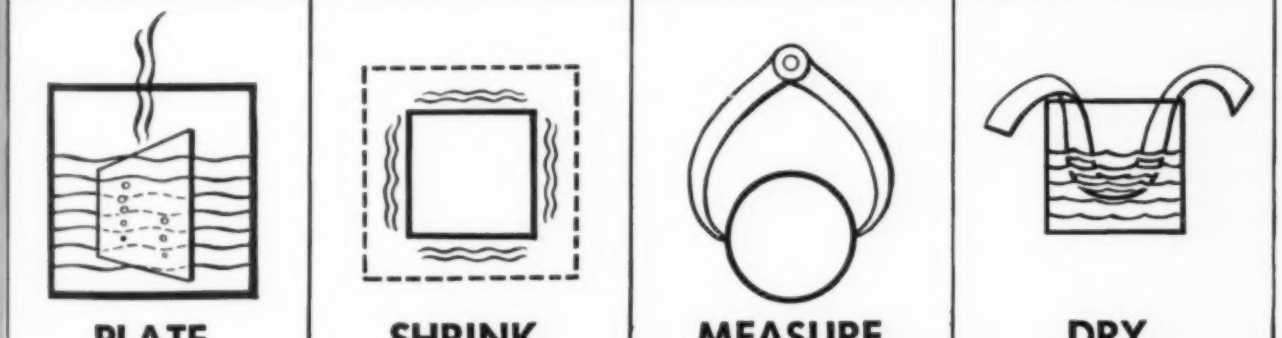

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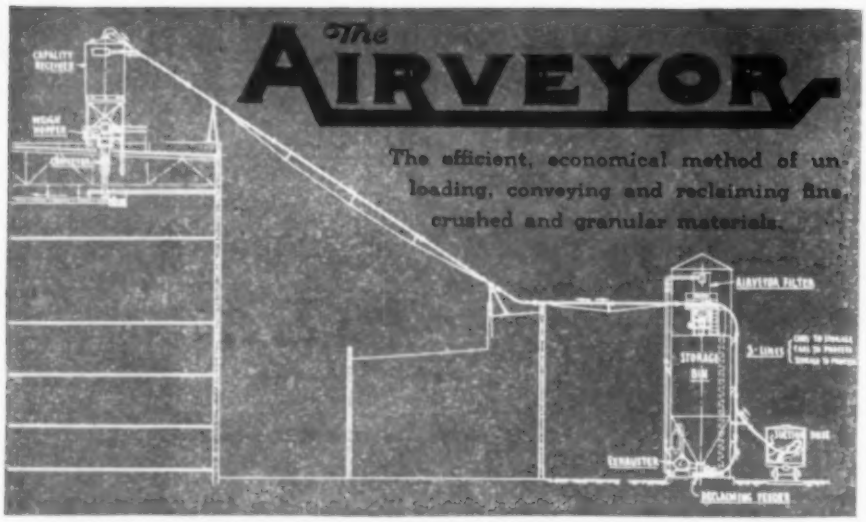

UNLOADING, CONVEYING AND RECLAIMING SODA ASH

The Airveyor System illustrated is used by a soap manufacturer to unload and reclaim light soda ash in bulk. Note the compact, simple layout of the system—the storage bin located alongside of the railroad track with the Airveyor filter directly above and the exhauster below the bin, within the same structure.

The System conveys (1) from cars to storage, (2) cars to process direct, (3) reclaims from storage for delivery to process. Unloading rate, six tons per hour from cars to storage. Reclaiming from storage to process, four tons per hour. Conveying distance approximately 200 feet.

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A-6

placed job orders with it. Technical and professional personnel leaving war industries are invited to notify the Roster and if they have not already registered, registration blanks will be sent to them.

CHEMICAL MEN MOBILIZE FOR VICTORY LOAN DRIVE

HOWARD R. SALISBURY, president of Airco Export Co. and chairman of the chemical industry division of the War Finance Committee for New York, was host at a recent luncheon meeting attended by the committeemen who have agreed to serve with Mr. Salisbury in achieving the industry's Victory Loan quota of $60,000,000. Harry Hufnagel of the Air Reduction Co. is co-chairman of the New York section. Other members of the committee are J. A. Brady, Airco Export Co.; R. H. DeGreef, R. W. Greef & Co.; F. C. Gens, R. T. Vanderbilt Co.; George F. Handel, Cincinnati Chemical Works; Stanford L. Hermann, Apex Chemical Co.; Albert M. Kahn, Consolidated Products Co.; Milton F. Martin, U. S. Industrial Chemicals; Ransdell Matthews, Merchants Chemical Co.; W. F. Reich, Carbide & Carbon Chemicals; Charles M. Richter, Pharma Chemical Corp.; George Seaman, Air Reduction Sales Co.; W. C. Shallcross, Solvay Sales Corp.; A. T. Wingender, General Dyestuff Corp.

EAGLE-PICHER BUYS INTO CANADIAN COMPANY

ACQUISITION of a substantial interest in the common shares of McArthur, Irwin, Ltd., of Montreal, Canada, has been announced by J. M. Bowlby, president of the Eagle-Picher Co. of Cincinnati. Plans are being formulated for the expansion of McArthur, Irwin, Ltd., into the manufacturing and marketing of litharge and red lead as well as increasing the company's present white lead business. Application permits for additional plant buildings to house the new operations already have been issued.

CORRECTION

IN THE October issue on page 99 of the *Chem. & Met.* Report on Surplus Property for Process Industries there appeared a table concerning synthetic ammonia plants. The footnotes 1 to 5 (inclusive) are correct; the others should read as follows: (6) Includes other chemicals. (7) Includes nitrogen equivalent of 11,500 tons per month of ammonium nitrate in 70 to 80% water solution. (8) Includes ammonium nitrate crystals production. (9) Being operated for fertilizer manufacture under arrangement with Commodity Credit Corp.

NEW GRANTS FOR RESEARCH ON USES FOR SUGAR

NEW grants for research, amounting to $38,200 by the Sugar Research Foundation have brought the grand total over the $415,875 mark. Dr. Robert C. Hockett, scientific director of the Foundation, announced awards to eight universi-

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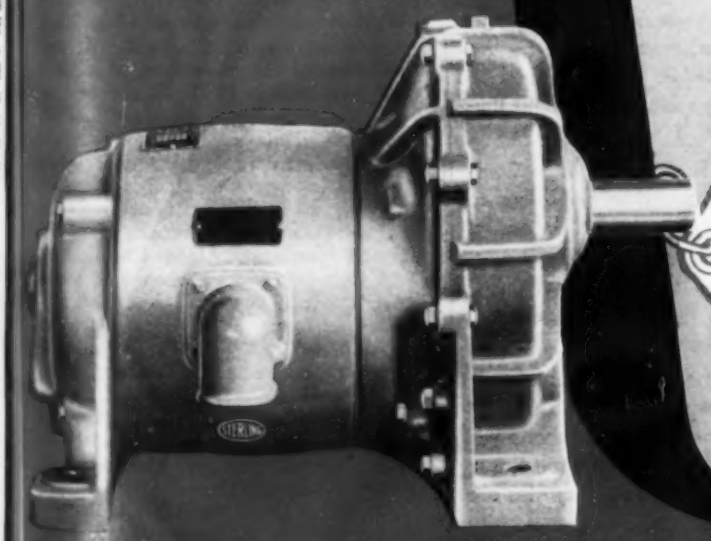

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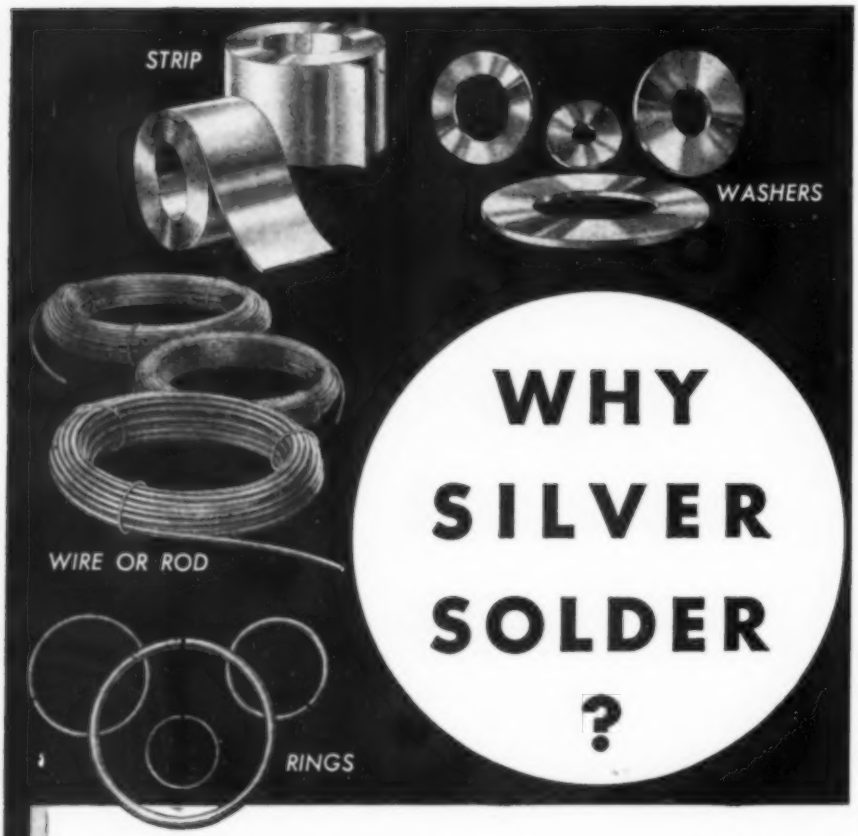

Silver soldering, because of its speed, economy, and durability has replaced for many purposes former methods of soft soldering, high temperature brazing, welding, riveting or bolting. Cast and forged constructions, in many instances, have been replaced by the faster and less expensive method of fabricating two or more easily joined parts, soldering them together, then finishing to dimension.

Modern alloys and light gauge metals, likely to be damaged by high temperature brazing or welding, have been particularly aided by the use of low temperature, fast spreading silver solder. Likewise, the use of preformed rings or washers has materially speeded up straight line production.

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ties and a state experimental station last month. Recipients of these grants include Purdue University, University of Utah, University of Texas Medical School, University of Wyoming, Emory University Medical School, the California Institute of Technology, Tufts Dental College, University of Rochester, and the New Jersey State Experiment Station.

WARTIME REGULATIONS ON EXPLOSIVES RELAXED

Wartime federal regulations governing non-military explosives and certain ingredients of explosives are being relaxed and individual licenses no longer are required for transactions in explosives. This announcement was made by Dr. R. R. Sayers, director of the Bureau of Mines who said the wartime measure was no longer necessary and the Control Division of the Bureau's Health and Safety Branch, which administered the Federal Explosives Act during the war, is being liquidated. The publication of a general license by the Department of the Interior automatically relieves thousands of individuals and organizations dealing in explosives from the necessity of having individual licenses.

CHEMICAL MEN HONORED FOR WARTIME ACTIVITIES

At a luncheon held November 13 at the Chemists' Club, New York, Maj. Gen. William N. Porter, Chief of the Chemical Warfare Service, presented Army Certificates of Appreciation to 10 leaders of the chemical industry for service of "inestimable value" to the War Department for more than five years. Issued by the Secretary of War, the citations were awarded to executives who served without compensation on the Chemical Advisory Committees of the Army-Navy Munitions Board since early in 1939 and as members of the Advisory Board to the Chief of CWS since February, 1945. Those receiving the awards were Harry L. Derby, president, American Cyanamid & Chemical Corp.; E. M. Allen, chairman of the board, Mathieson Alkali Works; Harry F. Atherton, president, Allied Chemical & Dye Corp.; James W. McLaughlin, president, Air Reduction Co. Also Lammot du Pont, chairman of the board, E. I. du Pont de Nemours & Co.; Charles Belknap, chairman of the executive committee, Monsanto Chemical Co.; Willard H. Dow, president, Dow Chemical Co.; George W. Merck, president, Merck & Co.; and Warren N. Watson, secretary, Manufacturing Chemists' Association.

At a dinner given November 13 by the chlorine industry in honor of Arthur B. Chadwick, president of Solvay Process Co., New York, Major General Porter presented Mr. Chadwick with a War Department Certificate of Appreciation. Mr. Chadwick served without compensation as chairman of the Alkali and Chlorine Subcommittee of the Chemical Advisory Committee since April 1939. He also served as chairman of the Chlorine Industry Advisory Committee of the War Production Board and reviewed monthly the chlorine requirements of CWS and assisted in satisfying the Service demands, the citation discloses.

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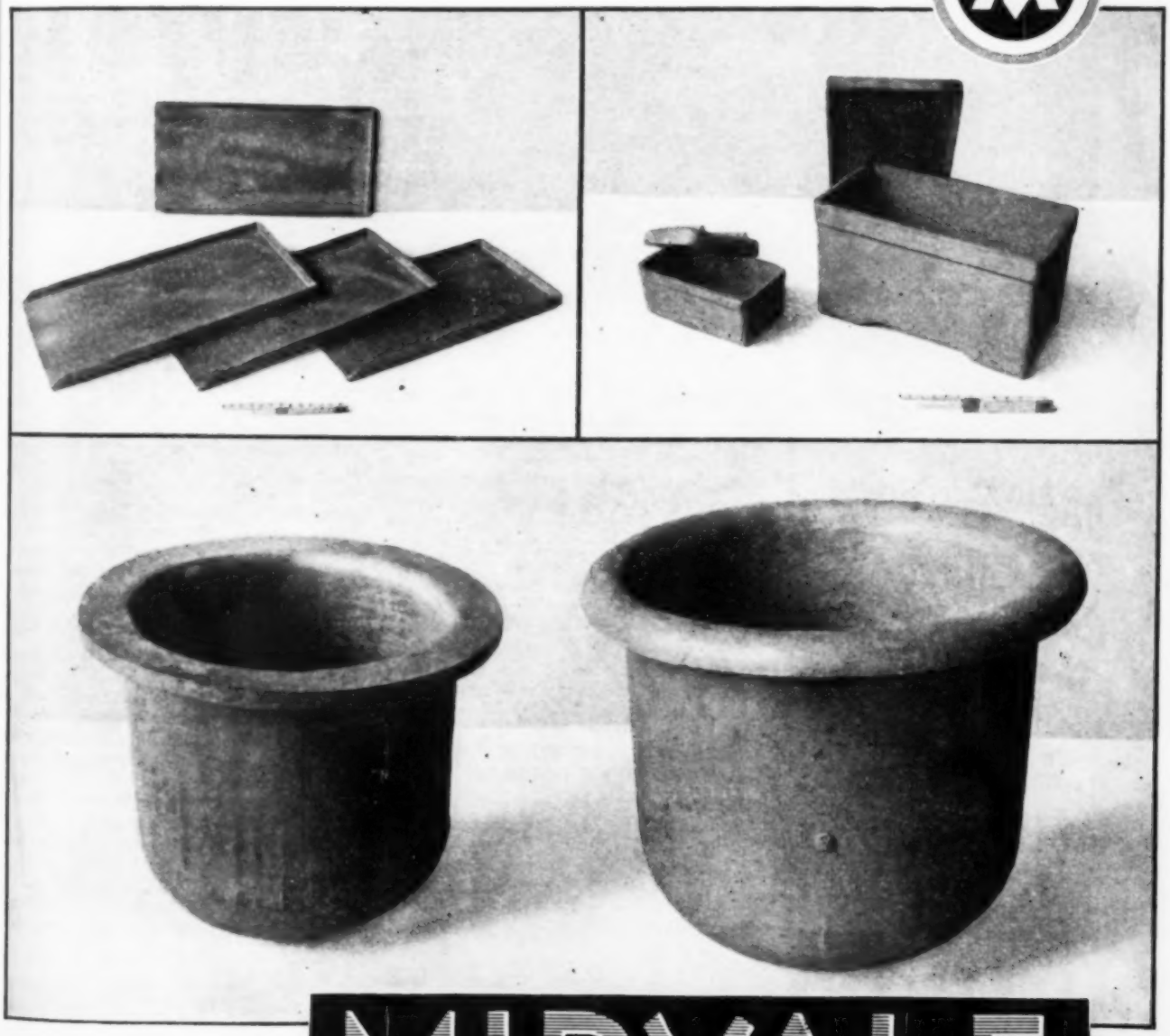

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JOHN R. CALLAHAM, Pacific Coast Editor, San Francisco, Calif.

HYDROLYSIS ALCOHOL PLANT TO BE COMPLETED

To COMPLETE the $2,000,000 industrial alcohol plant at Springfield, Ore., directors of the Reconstruction Finance Corp. have recently approved an additional advance of $450,000. The plant, being built by the Willamette Valley Wood Chemical Co. and financed by RFC, will produce alcohol by an improved wood hydrolysis process to become the first of its kind in this country. Construction was stopped after the war ended when the War Production Board chemicals bureau recommended that the project no longer be considered as necessary. When completed early next year, the plant will have a capacity of over 10,000 gal. daily of ethyl alcohol from 200 tons of wood waste. It will be the largest industrial alcohol plant west of the Rockies.

CHLORINE CAPACITY MORE THAN DOUBLED

MORE than doubled since the beginning of the war, the West's chlorine capacity now stands at slightly more than 500 tons daily, or approximately 10 percent of the nation's total capacity, as compared to the prewar figure of close to 175 tons. Largest of all the plants is the giant Basic Magnesium, Inc., unit in Nevada, which has a daily capacity of some 225 tons. This unit is now being operated by Stauffer Chemical Co. Next in size of the war-erected plants is the Rocky Mt. Arsenal of Chemical Warfare Service in Denver, Colo., with a capacity of 100 tons daily. These are the only government-owned plants in the area, and both will probably be sold or leased to private industry. Only as a last resort will government officials approve the dismantling and removal of equipment from these plants, much preferring development of new consuming industries nearby and continued operations in the present locations. Present chlorine and caustic soda production facilities in the West are listed in the accompanying table.

STAUFFER SUPERPHOSPHATE OUTPUT TO BE DOUBLED

ANNOUNCING new long-term contracts for additional sources of phosphate rock from the large Idaho deposits, Stauffer Chemical Co., San Francisco, expects to be able to double its western output of superphosphate fertilizer by early 1946, according to a company announcement. The firm's present superphosphate plant facilities at Stege, in the San Francisco Bay area, and at Vernon, near Los Angeles, will be expanded considerably to permit processing approximately twice the raw material now being used.

CALIFORNIA FORMALDEHYDE OUTPUT EXPANDED

TO AID in meeting the expanding demand for formaldehyde on the Pacific Coast for resin-bonded plywood and other uses, Commercial Solvents Corp. announces that facilities for producing this chemical from synthetic methanol will soon be expanded at the firm's Agnew, Calif., plant. At present the only producer of formaldehyde in the west, Commercial Solvents Corp. has been manufacturing this basic organic chemical in California since 1941. Plant manager at Agnew is R. B. Crowell.

WESTERN ALUMINUM FACILITIES ATTRACT INDUSTRY

EXPRESSIONS of confidence in the future of the West's vast, war-born light metals industries followed close in the wake of Congressional approval of a plan for disposal by the RFC of government plants in a manner that will foster competition in the industry. The policy, outlined by the Surplus Property Board, hit hard at the Aluminum Co. of America, which dominates the aluminum industry in the U. S., giving competitors of Alcoa first opportunity to purchase $700,000,000 worth of such plants. Officials of the Western States Council hailed the announcement as an anticlimax to a concentrated campaign begun by business leaders in the eleven western states, which the council represents, four months ago.

At least seven major corporations have joined thus far in the scramble for plant and production facilities, which the council is striving desperately to weld into a completely integrated industry in order to bring economic and industrial security to the West. Washington State, particularly in the Spokane area where the DPC's huge rolling mill is situated, has been a virtual hotbed of rumor and conjecture.

One rumor which spread rapidly was that the Ford Motor Co. had been making investigations concerning the Spokane mill. A spokesman for the company's Northwest division, however, stated bluntly that the

Western Producers of Chlorine

Operator	Plant Location	Erection Date	Type of Cell
Basic Magnesium, Inc.[1]	Las Vegas, Nev.	1942	Hooker S
Chemical Warfare Service[2]	Denver, Colo.	1943	Hooker S
Chlorox Chemical Co.[3]	Oakland, Calif.	....	Whiting
Dow Chemical Co.[3]	Pittsburg, Calif.	1917	Dow
Hooker Electrochemical Co	Tacoma, Wash.	1928	Hooker S & E
Pennsylvania Salt Mfg. Co.	Tacoma, Wash.	1928	Gibbs
Potash Co. of America[3]	Carlsbad, N. M.	1940	
Rayo Chemical Co.[4]	South Gate, Calif.	1942	

[1] Now being operated by Stauffer Chemical Co. [2] Not in operation. [3] Great Western Division; a large portion of output absorbed in same plant for production of chlorinated hydrocarbons. [4] Output largely absorbed in same plant for production of bleach solutions.

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company definitely is in no way contemplating purchase of the plant. Reynolds Metals Co. was expected to bid on the rolling mills and reduction plant there as well as the Troutdale, Ore., plant. It also proposes to build forging, fabricating and possibly extrusion plants at Spokane, and to continue operation of its own plant at Longview, Wash.

Columbia Metals Corp. of Seattle will submit an offer to operate the Spokane plant and the Troutdale installation, the government's reduction plant at Hurricane Creek, Ark., and its clay-alumina plant at Salem, Ore. Olin Industries, operating the government-owned plant at Tacoma, Wash., is expected to submit new operating plans. Aluminum Co. of America, American Smelting and Refining Co., Kaiser Co., Bohn Aluminum and Brass Corp., also are expected in on the bidding.

California plants at Los Angeles and Riverdale, if unattractive to bidders, probably will be held in stand-by condition or disposed of on a basis of recommended priorities.

GIANT EXPANSION PROGRAM FOR STANDARD OF CALIFORNIA

PLANS for a construction program, suspended by the war, totaling more than $20,000,000 were announced in October by Standard Oil of California through H. D. Collier, president. The largest part of these delayed expenditures will be at the company's Richmond and El Segundo, Calif., refineries, where approximately $15,000,000 will be spent. Included in this latter amount is nearly $2,000,000 for expansion of the Richmond laboratories and facilities of California Research Corp., Standard subsidiary devoted exclusively to research and development in petroleum refining and utilization. Included in the expansion program will be additions and improvements to the refinery, storage, distributing, producing and office facilities of Standard and its domestic subsidiaries.

GYPSUM OUTPUT EXPANDED FOR KAISER

CONSTRUCTION has now begun on the new facilities of Standard Gypsum Co. at Richmond, Calif., which were leased last year by Henry J. Kaiser, to turn out wallboard and other gypsum products for the prefabricated homes which Kaiser intends to market. It is expected that the new Richmond facilities will be completed by next April and will turn out, in addition to a maximum of 200,000 sq.ft. daily of wallboard, large quantities of agricultural gypsum, pebble gypsum and gypsum lath. Providing for a long-term raw material supply, the Standard Gypsum Co. has reached an agreement with the Mexican government for access to an estimated 500,000,000 ton gypsum deposit on San Marcos Island in the Gulf of Lower California.

ELECTRONICS CLINIC LAB OPENED BY WESTINGHOUSE

A NEW high frequency laboratory where western chemical and process industries can study in detail problems involving use of induction and dielectric heating has recently been established in Los Angeles by Westinghouse Electric Corp. Facilities of the

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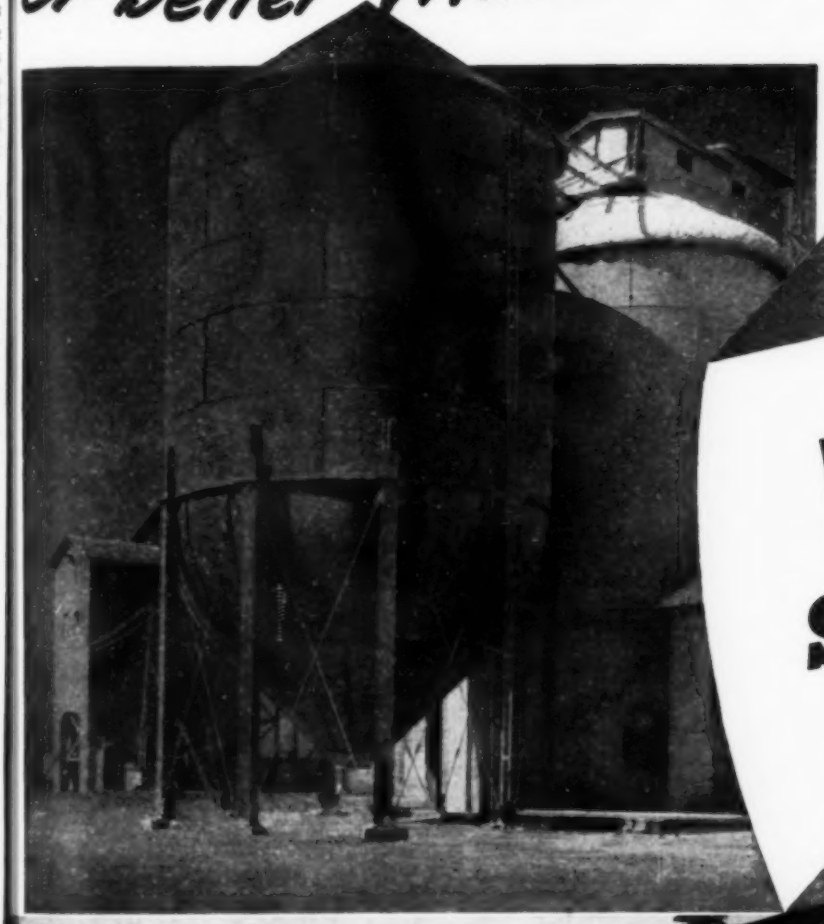

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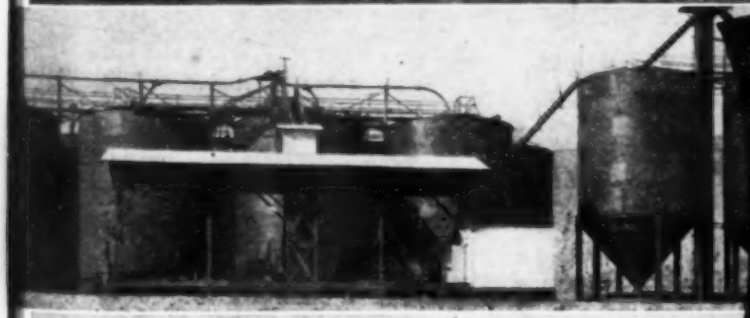

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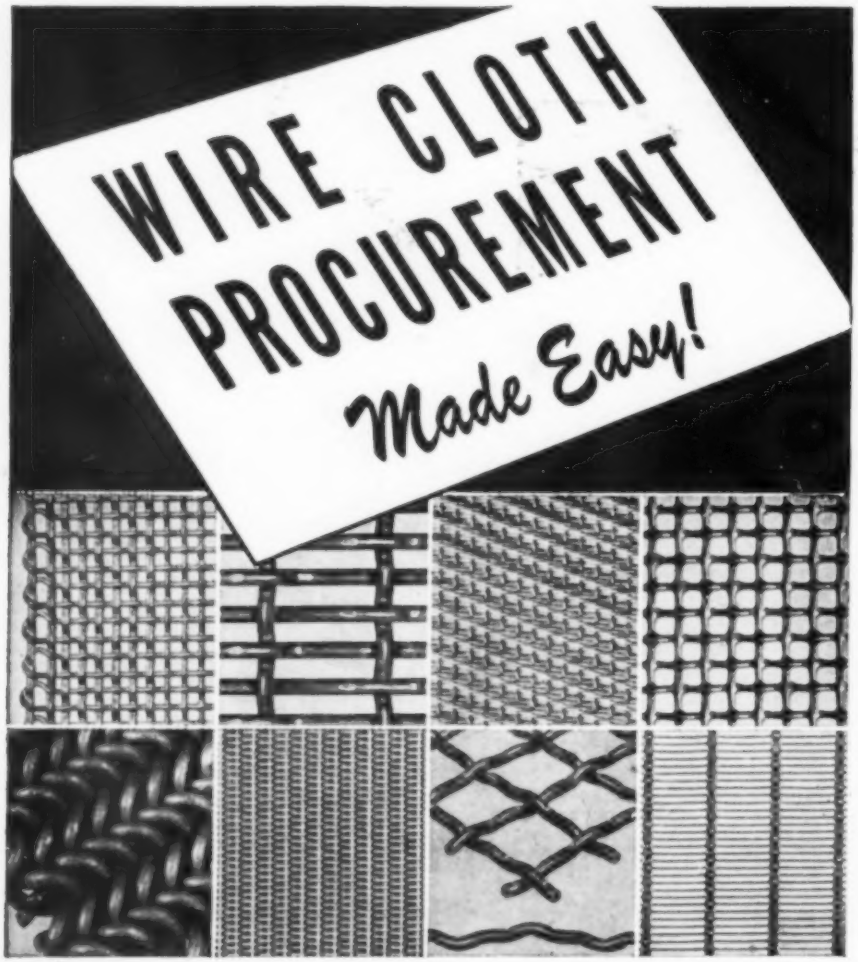

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clinic laboratory, which will be headed by Dr. Russell A. Nielsen, research engineer, will be ample to study techniques of high frequency heating in the chemical, metallurgical, beverage, plastics and adhesives, plywood, food processing and other fields.

BARBER ASPHALT EXPANDS GILSONITE OUTPUT

GILSONITE operations of Barber Asphalt Co. at Bonanza, Uintah County, Utah, are slated for another expansion, according to C. Sewell Thomas, Denver, consulting engineer for the firm. A previous $1,500,000 improvement and modernization program has been completed during the past 18 months. A $30,000 Raymond mill pulverizing plant is now being installed to meet a new demand for gilsonite dust collected in the washing plant. At first considered virtually a waste product, this grade has found a ready market for use in foundry cores. The new mill will produce some 4,000 tons of pulverized gilsonite monthly.

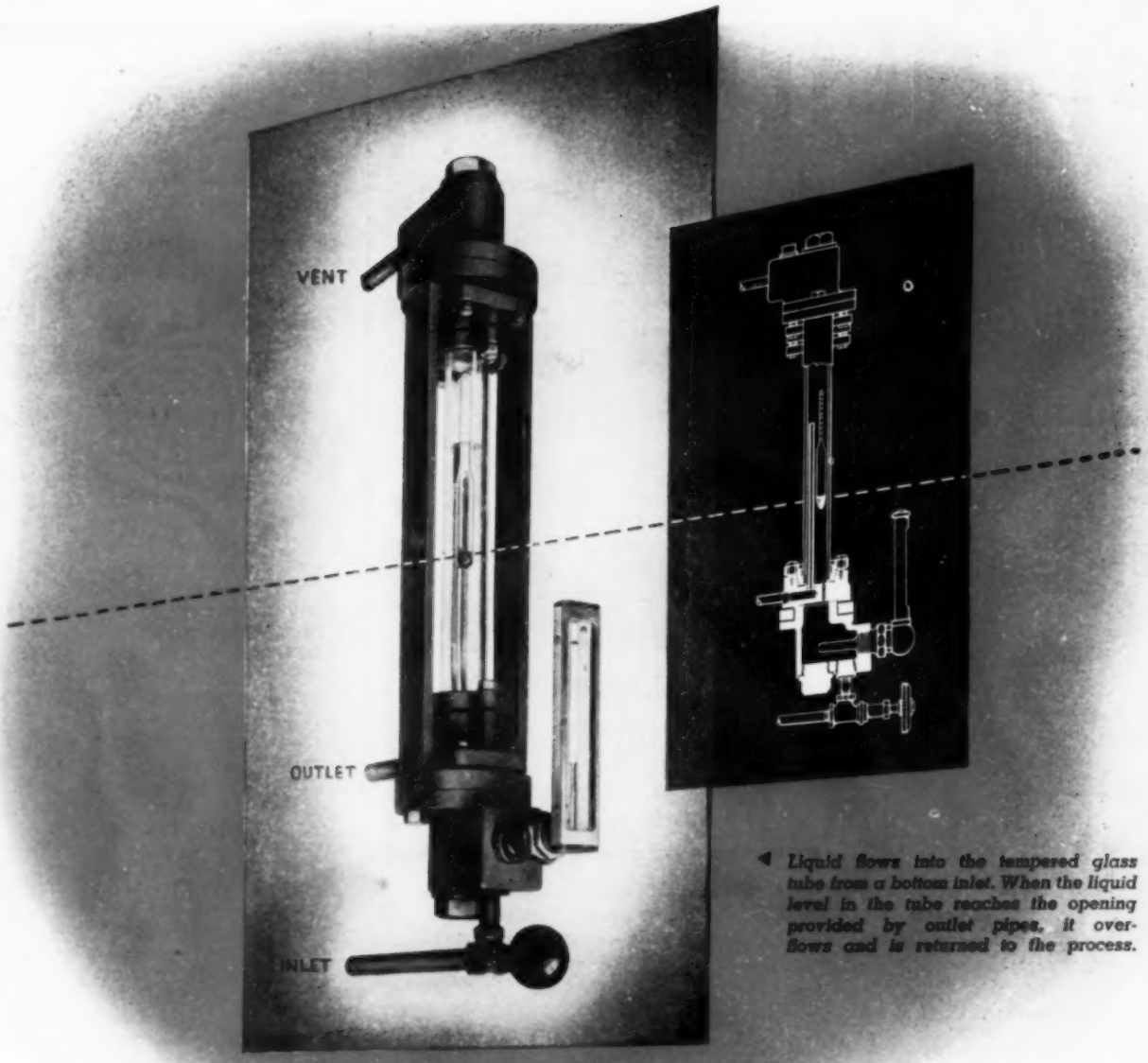
FATE UNCERTAIN FOR MANY EXPERIMENTAL UNITS

WITH the abrupt termination of the war and resulting confusion in respect to government-financed experimental plants, the fate of many such units in the west is still uncertain. Government sponsorship of the two present and four projected guayule extraction plants in California has been withdrawn. Both the 1-ton per day electrolytic manganese pilot plant near Las Vegas, Nev., and the sponge iron experimental unit at Laramie, Wyo., have ceased operations. Olin Industries, Inc., has closed down the company-owned alumina pilot plant of Kalunite, Inc., in Salt Lake City. This unit, costing over $5,200,000, was built with RFC assistance.

Fate of the government-sponsored $5,000,000 alumina-from-clay plant of Columbia Metals Corp. at Salem, Ore., is still uncertain although Northwest interests will probably find support for its operation. This 50-ton-a-day unit is now ready to make its initial runs. It is also held likely that the $4,600,000 alumina-from-shale unit of Monolith Portland Midwest Co. at Laramie, Wyo., will operate. This 50-ton pilot plant was build to tie in with the company's cement operations. There are reports that the $2,750,000 Willamette Valley Wood Chemical Co. wood hydrolysis alcohol plant at Eugene, Ore., will be completed by early 1946 and operated for experimental purposes by the U. S. Forest Service. The government-sponsored pilot plant for extracting resins from Arizona greasewood has completed its try-out runs and ceased operations; present status of the Utah Coal Co. unit for extracting 1,000 lb. of resins monthly from Utah coal is uncertain.

OLYMPIC PENINSULA POSSIBILITIES

STUDYING the natural resources and economic potentialities of the northern end of the Olympia Peninsula in Washington, a report by the Bonneville Power Administration, Portland, indicates that industrial employment in Clallam and Jefferson counties could by 1955 be increased nearly 60 percent above the 1940 level. A survey of the region's lumber and wood products in-



Liquid flows into the tempered glass tube from a bottom inlet. When the liquid level in the tube reaches the opening provided by outlet pipes, it overflows and is returned to the process.

For Convenience...

in the continuous indication of specific gravity

Intermittent sampling to determine specific gravity in a continuous process is often inadequate, time consuming and unsatisfactory. An instrument that permits continuous indication offers improved control as undesirable deviations can be noticed as soon as they occur. The SK Specific Gravity Indicator is a simple, dependable device which provides continuous indication of specific gravity by means of a standard hydrometer.

The SK Specific Gravity Indicator is adapted from the SK Universal Rotameter with which most parts are interchangeable. It is readily installed in new or existing pipe lines and may be located beside a convenient pipe line or front- or back-mounted on a centrally located panel. Although normally supplied in cast iron, bronze or stainless steel, it can be obtained in any alloy on special order.

Both inside and outside cleaning is easily accomplished without disturbing pipe connections. Packing glands are adjusted by cap screws, there are no large threads to corrode and freeze.

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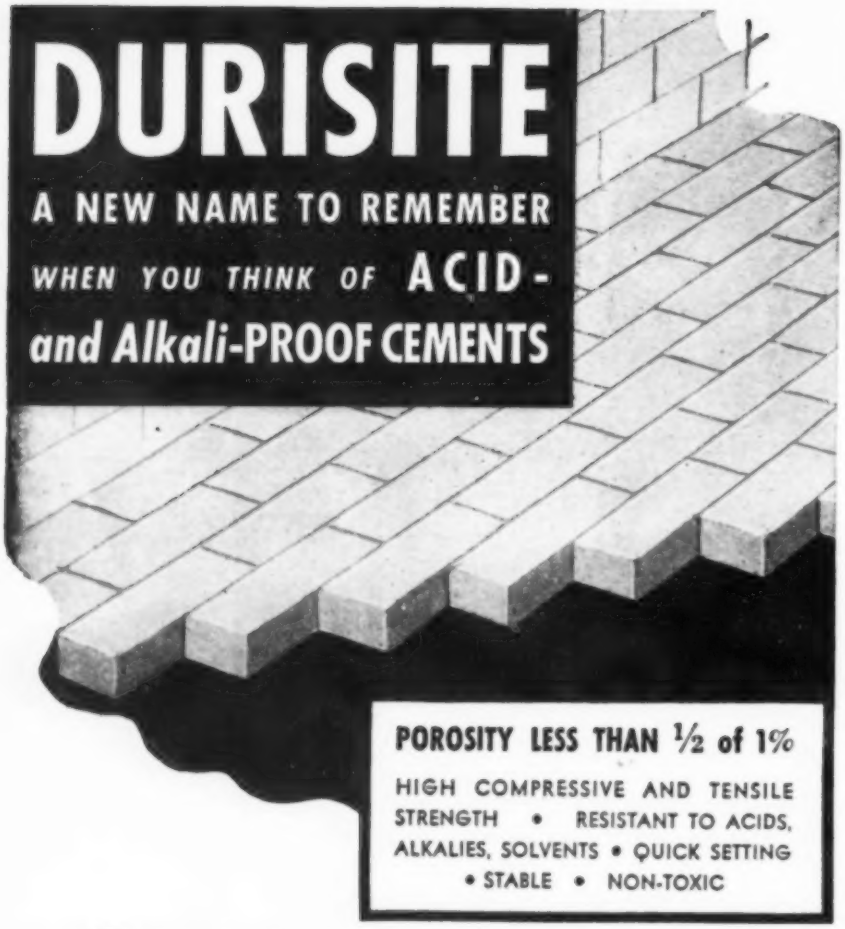
DURISITE

A NEW NAME TO REMEMBER WHEN YOU THINK OF ACID- and Alkali-PROOF CEMENTS



POROSITY LESS THAN ½ of 1%

HIGH COMPRESSIVE AND TENSILE STRENGTH • RESISTANT TO ACIDS, ALKALIES, SOLVENTS • QUICK SETTING • STABLE • NON-TOXIC

DURISITE is a resinous cement with important *new* properties. Unlike most resinous cements, it is completely stable in storage. You can carry supplies on hand ready for use when needed. No vexatious delays while orders clear. No costly waste from deterioration in storage. And, unlike most resinous cements, Durisite is non-toxic. Durisite has no dangerous effect on the skin.

Durisite will handle most acids (including hydrofluoric in all concentrations), alkalies of any degree of strength, all oils and solvents, at temperatures up to 350°-375° F. It will handle strong acids and alkalies alternately. Durisite is a cement of unusual strength (compressive and tensile strength is approximately four times that of silicate-type cements). Durisite's dense, non-porous structure is permanent, remaining completely non-absorbent and impermeable even at elevated temperatures.

Durisite is a quick-setting cement. Brick can be laid as fast as the workmen can handle them, course upon course, with no danger of the mortar being squeezed out from the lower courses.

Time proven in extensive laboratory and field tests over a period of three years, Durisite is setting new records for durability in tough acid-*and-alkali*-proof masonry construction.

THE U. S. STONEWARE CO.

Dept. CM, P. O. Box 350 **Akron, Ohio**

Please mail me_____copies of your new Research Bulletin R-5 on Durisite Cement.

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U. S. STONEWARE

Since 1865 *Akron, Ohio*

dustries indicates possibilities of expansion in fabrication of Port Angeles plywood, production of wallboard from logging waste, and further processing of semi-finished or waste materials of the region's four pulp, paper and paperboard mills. Research is now being promoted to utilize commercially the lignin, sulphur, sugars, plastic materials, hemlock bark tannin and other materials now wasted.

PLYWOOD RESEARCH TO STRESS NEW PRODUCTS

Now starting operations is the new Plywood Research Foundation in Tacoma, Wash., which was organized last year by Douglas fir plywood manufacturers of the Pacific Northwest to conduct research in this field. With an initial appropriation of $100,000 to be added to as needed, the foundation has for its primary objectives: (1) Development of new products which plywood factories can manufacture in addition to their present panels, (2) improvement of Douglas fir plywood through chemical means, (3) development of means of using waste woods resulting from present processing at plywood factories and in the forests, (4) improvement in the production techniques and properties of this plywood through better processing and manufacturing equipment. The Plywood Research Foundation has its own staff and will carry on research independently of the sponsoring Douglas Fir Plywood Association.

SOIL FUMIGANTS TESTED IN CALIFORNIA

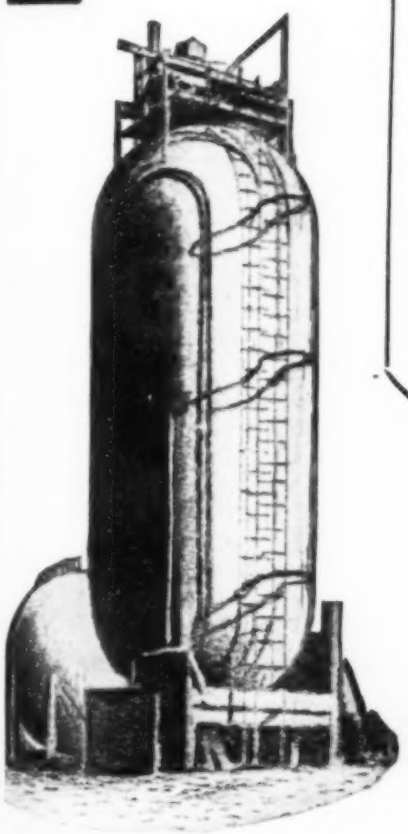
INDICATIONS that large-scale soil fumigation is economical with either dichloropropane-dichloropropylene mixture or ethylene dibromide were found in the results of two years of experiment by the University of California, Davis campus. Control of wireworms, which infest about 250,000 acres of irrigated soil in California, is commercially possible with the two new soil fumigants, according to W. H. Lange, junior entomologist. Use of the mixture at the rate of 400 lb. per acre produced satisfactory results in the Salinas and Sacramento valleys; the second fumigant in dosages of 2-4 gal. of pure chemical dissolved in 20-40 gal. of naphtha thinner, also gave excellent control. The two fumigants are drilled into the soil prior to planting by special applicators.

NORTHWEST ALCOHOL DEPENDS ON CHEMICALS

DEVELOPING a market for the product will undoubtedly soon become the principal problem of the war-established Pacific Northwest alcohol industry, according to R. D. Tousley of Washington State College in a recent study on the economics of industrial alcohol. Prior to the war, industrial alcohol was produced in the Northwest only in experimental quantities from potatoes and consumption for the area probably did not amount to more than 150,000 gal. per year. Present production capacity is some 2,000,000 gal. annually, but may rise to about 6,000,000 gal. if the wood hydrolysis plant in Eugene, Ore., now under construction begins operations. Nearest large market is California with a prewar

FROM THE CATALOG OF

BARRETT BASIC CHEMICALS...



PYRIDINE NO. 2A

An exceptionally close-cut fraction used in the preparation of Sulfapyridine and other sulfa drugs, and in the manufacture of dyestuffs. Also a starting material for Niacinamide (Amide of Nicotinic Acid) and Piperidine.

PYRIDINE CONTENT: Approximately 98 per cent.

DISTILLATION: Maximum Range not to exceed 2°C. First Drop not below 114°C. Dry Point not above 117°C.

SPECIFIC GRAVITY: 0.985 to 0.990 at 15.5°C

WATER CONTENT: Trace.

COLOR: Water White (Discolors slowly on standing).

SOLUBILITY IN WATER: Complete.

SHIPPING CONTAINERS: Tank cars, 50-gallon drums, and 1-, 5- and 10-gallon cans.

AVAILABILITY: Presently available without allocation.

Awarded to the men and women of the Barrett Frankford Chemical plant

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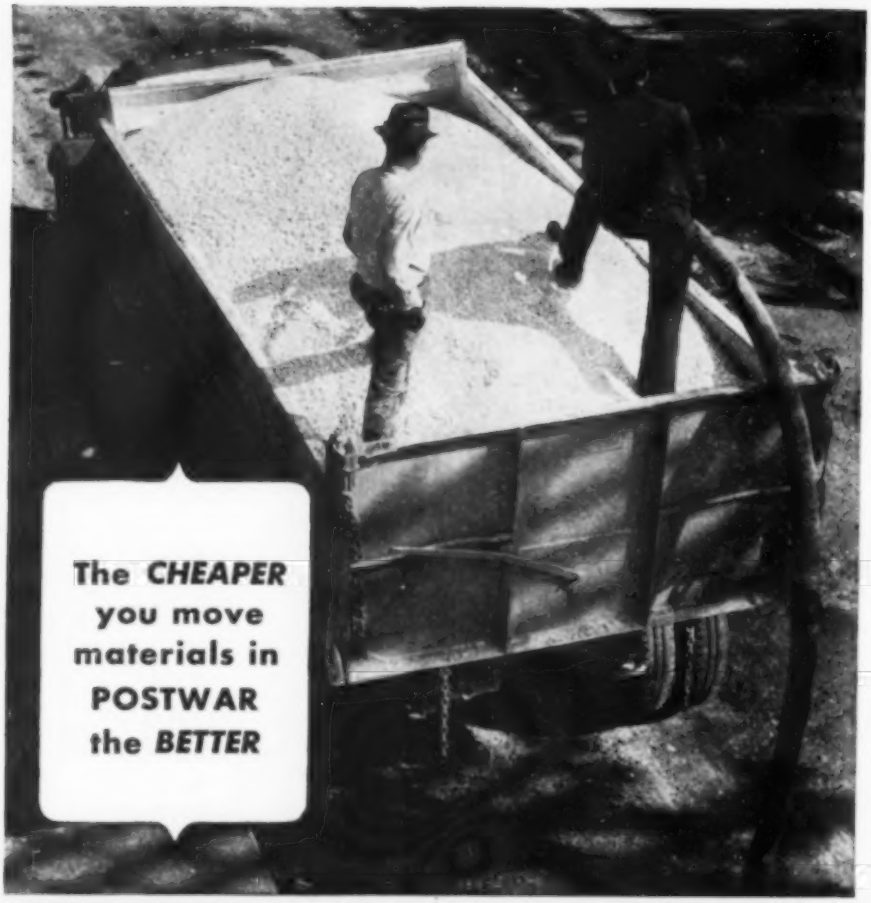

Consult **DRACCO** Engineers

In order to meet postwar competition it is necessary to reduce costs to the minimum. The moving of chemicals, grains and granular materials should be given consideration because many are not aware that their handling costs can be reduced. Wherever DRACCO Pneumatic Conveyors have been installed handling has been done more efficiently and cheaper — with fewer man hours. Why not let DRACCO Engineers check your present methods for you? They have over 30 years' experience and have reduced handling costs to the minimum for many.

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DUST CONTROL EQUIPMENT
PNEUMATIC CONVEYORS • METAL FABRICATION

consumption of about 3,000,000 gal. yearly but with a productive capacity of probably twice this gallonage.

Hence, best potential large-volume outlets for Pacific Northwest alcohol would seem to lie in the general industrial development of the region and in establishing an organic chemical manufacturing industry in the area, according to Prof. Tousley, that would use alcohol as a primary raw material. Most important basic industrial chemicals that can be derived from alcohol include acetic acid and acetaldehyde, ethly chloride and acetate, ethylene dibromide and ethylene gas. None of these are now being produced in the Pacific Northwest.

GLASS SAND OUTPUT EXPANSION PLANS

Owens Illinois Pacific Coast Co. has purchased the P. J. Weisel, Inc., glass sand plant near Corona, Riverside County, Calif., and plans to increase the output of high-quality silica from about eight cars a week to ten cars a day, it was announced in mid-October by Grant A. Van Valin, manager of the mine. The deposit, rare in Southern California, was discovered in 1925. Owens-Illinois has glass plants at Oakland which obtain silica sand at Del Monte, and in Los Angeles.

ELECTROCHEMICAL UNIT PLANNED FOR NEVADA

First unit of an electrochemical zinc-lead reduction plant to be built near Pioche, southeastern Nevada, by the Bristol Silver Mines Co. is planned for construction within the year, it was disclosed recently by J. H. Buehler, manager for the Salt Lake City mining company. The Bristol company, second largest contractor for Boulder Dam power in Nevada, is "satisfied with the withdrawal features of Boulder Dam power as it could get what power it needed within a six month period," Mr. Buehler was quoted as announcing.

GLUCOSE UNIT PLANNED FOR OREGON

A new company that will process wheat into glucose is being formed at The Dalles, Ore., it was reported recently. To be capitalized at $800,000, the firm plans to construct a plant on the site of the Kaiser Co. shipyards at The Dalles on the Columbia River. Sponsors of the project are state granges of Washington and Oregon. There are already two cooperative units of the granges producing glucose, one at Wenatchee and the other at Lynden, Wash.

URANIUM TEST DEVELOPED IN SALT LAKE CITY

With attention now on atomic energy from uranium and possible sources of this element in the western states, the U. S. Bureau of Mines Intermountain Experiment Station in Salt Lake City announces that a new quick and reliable qualitative test for uranium has been developed. The usual methods for determining uranium are laborious and time-consuming; the new test is more specific and sensitive as well as much faster and simpler. It is based on the greenish-yellow fluorescence produced

NEW PLANT of

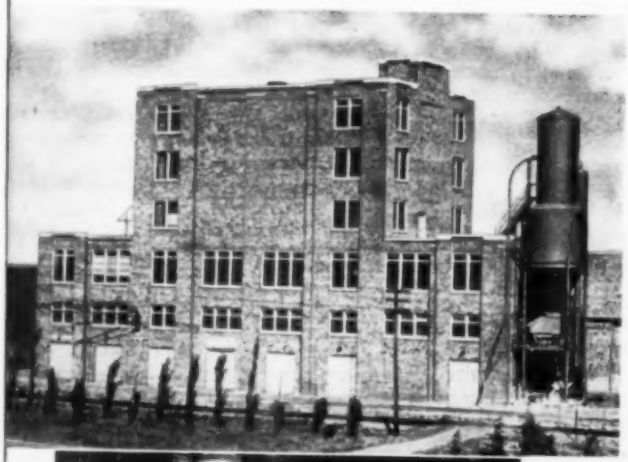
PUGET SOUND PULP & TIMBER CO.

BELLINGHAM, WASHINGTON

Operated for Defense Plant Corporation

For Producing **ETHYL ALCOHOL**

FROM **WASTE SULPHITE LIQUOR**



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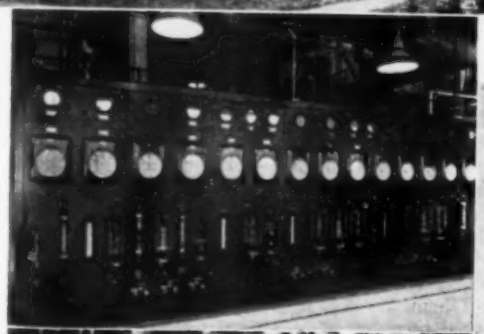

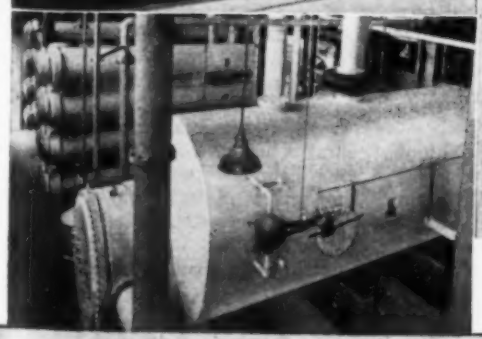

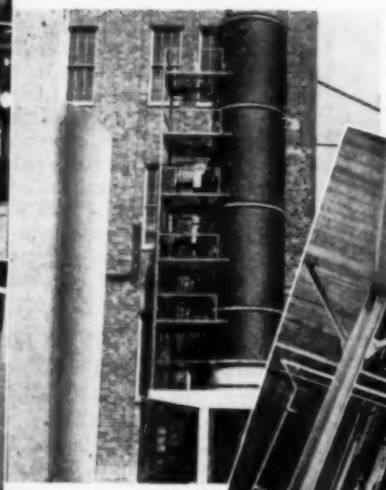

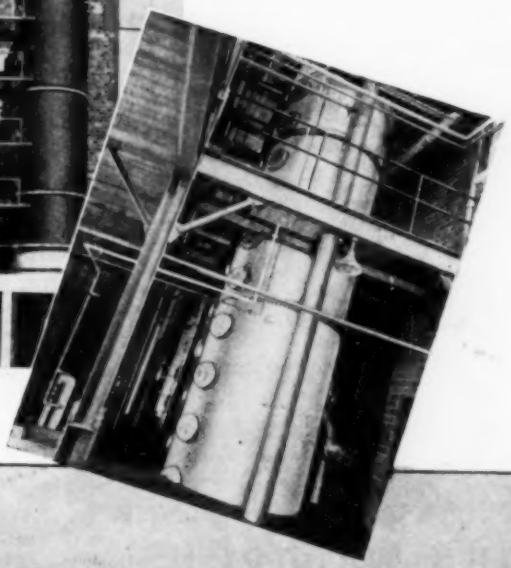

DISTILLATION

EVAPORATION

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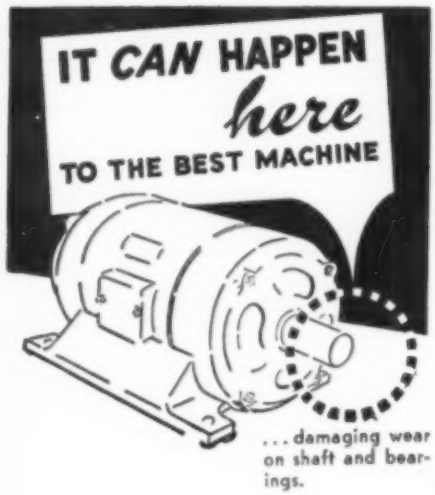
THE **VULCAN** COPPER & SUPPLY CO., CINCINNATI, OHIO



... damaging wear on shaft and bearings.

"Penny wise and pound foolish" is the old adage that best describes the practice of using any old coupling with a good and costly machine. By preventing wear to the shaft and bearings.

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WHEN YOU SPECIFY

WALDRON *Gear Type*
COUPLINGS

Forged steel hubs and sleeves (no welding) avoid need for frequent repair or replacement; complete freedom of movement between hub and sleeve prevents any added stress on shaft and bearings while compensating for misalignment. Other design refinements described in our Catalog No. 56.

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when a solution containing hexavalent uranium is exposed to the short-wave ultraviolet rays of 2,537 Angstrom units produced by the Mineralight of Ultra-Violet Products, Inc., Los Angeles. The test, applied to many hundred samples of vanadium ores from the west, revealed that uranium is absent from a large percentage of such ores.

INDUSTRIAL CARBON FROM OREGON COALS

OREGON coals for industrial carbon production will be studied by Oregon State College researchers under the terms of a two-year cooperative agreement with the Bonneville Power Administration to become the first of a series of similar industrial research projects which will be undertaken jointly by educational institutions in Oregon, Washington and Montana and by Bonneville Power. Carbon, in one of several forms, is a basic material to electrochemical and electrothermal industrial processes such as production of calcium carbide, ferro-alloys, phosphoric acid and phosphates, silicon carbide and aluminous abrasives.

Research will be conducted under the direction of Dr. G. W. Gleeson, dean of engineering at Oregon State College, and John N. Carothers, chief of Bonneville's industrial analysis section. Studies will include investigation of the possibility of removing sufficient ash from Coos Bay coal to produce a coke satisfactory for smelting operations at a cost competitive with other sources of smelting coke.

WEED KILLER HORMONE PRODUCED IN CENTRAL VALLEY

IN LARGE-SCALE production since last spring, Veith Chemical Co., Fresno, Calif., is now one of the seven manufacturers in the United States turning out the new 2-4-D hormone weed killer known chemically as 2-4 dichlorophenoxyacetic acid and used in agriculture, especially for controlling noxious perennial weeds. Both a basic producer of the chemical and a formulator of the compound and its salts for weed control purposes, Veith Chemical Co. has been supplying substantial quantities of the hormone to Central Valley agriculturists.

CALIFORNIA HONORED FOR ATOMIC BOMB WORK

FOR THE part the University of California took in aiding to win the war, Maj.-Gen. Leslie R. Groves, who headed the atomic bomb project for the U. S. Army, recently presented president R. G. Sproul with a Scroll of Meritorious Service. It was on the Berkeley campus that the cyclotron was invented by Dr. E. O. Lawrence, Nobel prize winner. It was here that uranium 235 was obtained, that the new elements neptunium and plutonium were discovered. It was at Berkeley that methods were worked out that were used in other parts of the atomic bomb project. In short, the declaration was made, it was from the work first done at Berkeley that the entire project stemmed. President Sproul stated that during the war years the University had spent more money for research on atomic energy than it had spent on all research during its previous 77 years of existence.

At another ceremony at the University of California Los Alamos Scientific Laboratory in New Mexico, the Army-Navy E award, with three stars, was presented to the University. The Los Alamos project has been operated by the University since its inception and was directed by Dr. J. Robert Oppenheimer, professor of physics on the Berkeley campus. It was at this project that for more than two years scientists worked on development of the atomic bomb. Work is still going ahead at the Los Alamos laboratory, but there is no indication as to the direction it is taking.

CHEMICAL COLOR PLANT FOR BAY REGION

COMPLETION of plans and appropriation of necessary funds for a chemical color pigment plant in California have been announced by Reichhold Chemicals, Inc., Detroit. The new unit will be located at the firm's present synthetic resins plant in South San Francisco. It is expected to produce chrome yellows, chrome greens, zinc chromate and organic lakes and toners from basic raw materials such as chromium chemicals and organic intermediates and dyestuffs to be supplied by the firm's projected dry color plant at Tuscaloosa, Ala. Manager of Reichhold's S. San Francisco unit is M. W. Reece.

RFC PLANTS LISTED FOR NORTHERN CALIFORNIA

EIGHTEEN northern California plants are included in the second advance listing of government-owned industrial plants published by the Office of Surplus Property, Reconstruction Finance Corp. The publication provides information as to locations, sizes and general features of the properties, most of which will be available for peacetime industrial use. Some of the chemical and process plants still owned by the government in Northern California are listed below. (More information is available from the San Francisco office of RFC.)

Government-Owned War Plants in Northern California

Product	Plant Location	Present Lessee	Rated Capacity, Tons per Year	Total Acreage	Area of Buildings, Sq. Ft.
Sulphuric acid	Richmond	General Chemical Co.	65,000	10	2,000
Aluminum powder	Emeryville	Merrill Products Co.	1,800	....	.....
Magnesium metal	Manteca	Permanente Metals Corp.	10,000	138	207,430
Synthetic rubber catalyst (1707)	Newark	Westvaco Chlorine Prods.	.....	4 3/4	20,000
Oxygen	San Francisco	Stuart Oxygen Co.	46 M cu. ft.	....	.....
Calcined magnesia	Newark	Westvaco Chlorine Prods.	100 (daily)	....	4,100
Aviation gasoline	Richmond	Standard Oil Co. of Calif.	8,000 B. P. D.	40.8	.....
Aluminum ingots	Riverbank	Aluminum Co. of America	48,000	19	476,000
Steel castings	Pittsburg	Columbia Steel Co.	30,000	43	395,000
Incendiary ammunition (loading)	Turlock	Day & Night Flare Corp.	.....	154	88,905
Steel scrap	Pittsburg	California Scrap Iron Corp.	45,000	6 2/3	2,600

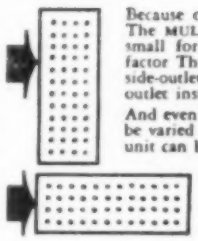
Question: WHICH DUST RECOVERY EQUIPMENT GIVES NOT ONE—BUT ALL THESE IMPORTANT ADVANTAGES?

MINIMUM PLANT SPACE

The unusual compactness of The MULTICLONE is a valuable advantage whether the installation is made in a new plant or an existing structure. The accompanying chart shows how other types of equipment compare with The MULTICLONE on space requirements, all figures based on units of comparable performance. Note how the MULTICLONE requires as little as *1/6th* the floor space, as little as *1/4th* the cubic space of other equipment. Put these figures in terms of costly plant space in *your* building and figure how vital this MULTICLONE saving is!

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.8	3.9

MAXIMUM ADAPTABILITY



Because of its great adaptability to "shoe horn" spaces, The MULTICLONE can often be fitted into areas *far* too small for other equipment. Where low headroom is a factor The MULTICLONE can be installed with side-inlet side-outlet. Or for restricted side clearance, side-inlet top-outlet installations can easily be made.

And even the shape of the MULTICLONE unit can readily be varied to fit space limitations. For example, a 48 tube unit can be 4 tubes deep and 12 wide to fit a wide, shallow space . . . or 12 deep and 4 wide to fit a long narrow space . . . or still other arrangements without affecting the operation or capacity of the unit. Gives maximum flexibility to fit cramped spaces!

HIGH RECOVERY

It is an established fact that the separating efficiency of a cyclonic tube becomes greater as the tube diameter *decreases*, due to the fact that the smaller the radius the greater the centrifugal forces that are generated. And higher centrifugal forces mean more complete separation of even the *very fine*, as well as the coarse particles.

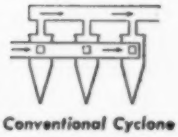
The patented *same* in the MULTICLONE—an exclusive feature—makes the use of small tubes practical, without complicated manifolding and permits compacting many *small*-diameter tubes into one simple, highly efficient unit.

This is one of the reasons why The MULTICLONE collects not only the coarser particles, but also an unusually high percentage of the *very fine* particles of 10 microns and less!

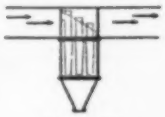
SIMPLE INSTALLATION

In place of the costly complicated inlet and outlet manifolding necessary with conventional cyclone systems, The MULTICLONE requires only a *single* inlet and a *single* outlet header to supply an entire bank of tubes. It's simple, easy to install, easy to insulate, easy to maintain.

In addition, in the MULTICLONE a single collecting hopper serves an entire bank of tubes—far easier to both install and service than the separate-hopper-for-each-tube arrangement of conventional cyclones!



Conventional Cyclone



Multiclone

STILL OTHER ADVANTAGES. The MULTICLONE is the result of over 38 years of concentrated research in the field of dust recovery, beginning with the first commercial application of the well-known COTTRELL Electrical Precipitator. It embodies so many important advantages—advantages that mean long life, low draft loss, minimum maintenance, and high operating efficiency—that you should get the full story of The MULTICLONE before you invest in *any* recovery equipment. Let one of our trained engineers make recommendations on the most economical solution to *your* recovery problem. A wire, letter or phone call places this assistance at your service!

Send for this free MULTICLONE booklet.

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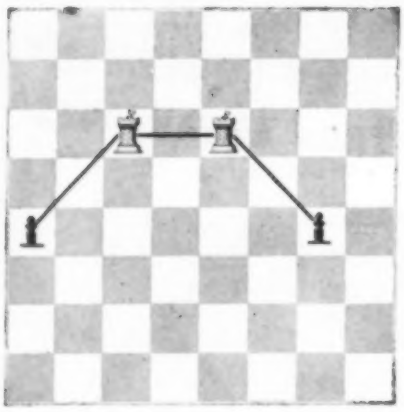


This is not good chess

...BUT IT'S A GOOD FORMULA

Becco Electrolytic Hydrogen Peroxide—100 volume—is a clear water-white liquid of outstanding storage stability. It contains 13.0 per cent active oxygen or 27.5 hydrogen peroxide by weight. Its specific gravity is 1.10; apparent pH (glass electrode) 2.1; dry residue—not over 0.10 per cent; ash—not over 0.04 per cent. Can be shipped in tank cars, aluminum drums or in glass carboys.

Higher concentrations available in small amounts for research investigations. Becco Electrolytic Hydrogen Peroxide is at present available in limited quantities.

SOME SUGGESTED APPLICATIONS

Most universal low-cost bleaching and oxidizing agent.

Does not leave undesirable residue, odor or by-products.

Can be handled through pumps, and well-known feeding and mixing devices.

Antipitting agent in metal plating.

Has excellent bactericidal properties.

Inexpensive promoter for polymerization reactions, especially in emulsions.

Oxygen release from hydrogen peroxide can be precisely controlled as to rate, quantity and size of bubbles. This unique property is of importance for making porous and inflated articles and in the uniform distribution of oxygen gas in reaction mixtures.

ACTIVE OXYGEN IS ON ACTIVE DUTY

Other Becco Products:

Ammonium Persulfate**
Potassium Persulfate
Magnesium Peroxide*
Calcium Peroxide*
Zinc Peroxide*
Pyrophosphate Peroxide*
Sodium Carbonate Peroxide*
Urea Peroxide
Acetyl Peroxide*

**Available in research quantities only at present.*

***Will be available after the war.*

BUFFALO ELECTRO-CHEMICAL COMPANY, INC.

BECCO

BECCO SALES CORPORATION

SALES AGENTS BUFFALO 7, N. Y.

NEWS FROM ABROAD

EXPORT AND IMPORT CONTROLS OVER CHEMICALS HAVE BEEN RELAXED IN GREAT BRITAIN

Special Correspondence

A FAIR AMOUNT of fresh demand shows itself on the British chemical markets. Buyers who went slow when war contracts came to an end are re-entering the arena. Even during the lull the firm tone of the market was not in any way affected by cancelled war business. There have been a few price cuts—aluminum, quicksilver, sulphuric acid are among the more important ones—but the tendency remains firm and steady. Contract deliveries proceed regularly, and new business is booked again after a quiet few months when holidays, political changes and transition adjustments kept buyers away. On the other hand, the labor position is distinctly easier, shipping and insurance costs are lower, makers of specialties begin to advertise that supplies are again available, and there are other pointers to more price revisions to come. Even so sales managers do not feel any anxiety, for the goods going out now are for consumption and neither producers nor consumers have big stockpiles.

The process of de-control continues. Methanol, formaldehyde, meta-formaldehyde and hexamine can be sold and used without license. The pyrethrum control has come to an end, and the Supply Ministry's stocks of pyrethrum flowers are available for civilian needs. The license-free quantity of industrial alcohol has been raised from one Imp. gallon a month to 60 gallons in six months. The purchase licenses for toluene are replaced by disposal licenses which should be granted freely since the Ministry of Supply contracts have been terminated. Limited quantities of nylon yarn have been released for civilian use, though the Silk Controller still issues permits. The Plastics Controller has been released, and his office becomes a section in the Raw Materials Department of the Ministry of Supply. The Non-Ferrous Metals Control is converted into a Non-Ferrous Metals Directorate. These may be small changes, but they are links in a long chain.

FOREIGN TRADE

In foreign trade there are parallel relaxations. Feldspar, bauxite, fluorspar, kelp, kyanite, monazite sand, nickel ores, concentrates, residues and matte, peat moss, seaweed, and sillimanite can be imported freely from all countries. Some of the mentioned minerals have experienced a home-production boom in wartime, and it remains to be seen how domestic producers will fare in competition with foreign suppliers. As far as chemical manufactures, as distinct from raw materials, are concerned, the authorities are not apparently keen on encouraging imports. The trade statistics for the first six months of this year which have now been released show that of the imports of chemical manufactures and semi-finished products (Group III O of the official classification) the bulk represents a few bulk products such as metallic pigments, carbon black, potassium muriate, superphosphates, and ammonium phosphate. These articles accounted for £4,250,000 out of a total of £11,450,000 of chemicals imported into the United Kingdom in January-June last, and most of the rest consisted of chemicals which must be considered raw materials or else cannot be made in the British Isles.

In the export trade the change has been most marked of late. In the first six months of this year chemical exports from Britain totaled £16,440,000 (against £14,030,000 in the first half of 1944 and £22,280,000 in the whole of 1938). Since then great efforts have been made to increase exports, and the staple export commodities—coal-tar products, ammonium sulphate, disinfectants, copper sulphate, caustic soda, and sodium compounds in general—have certainly met with excellent market conditions abroad, not least in the liberated countries of Europe. The export drive has been given a special stimulus by the removal of more than 150 chemical items from the export licensing list as from September 24. This sweeping measure has been taken at a moment when chemical manufacturers are in a position to avail themselves of the new opportunities opened to them and follows on negotiations which have proved the existence of a huge market for British chemicals abroad.

EXPORT LICENSES

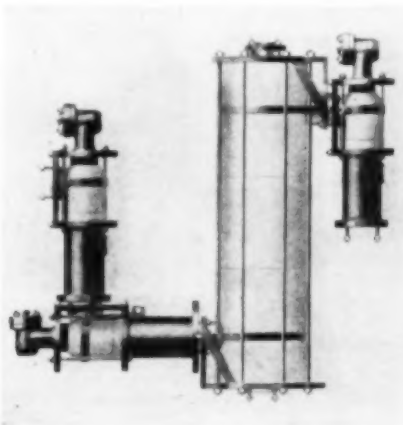
The list of chemical products for which export licenses are still required contains all fertilizers (which are needed to supply British agriculture). It contains lead, silver, antimony, barium, bismuth, potassium, selenium and titanium compounds, but no copper, nickel, zinc, tin, cobalt, or manganese compounds. Of sodium compounds only the nitrate, salicylate and arsenite require a license, while among acids licenses are stipulated for citric, nicotinic, phthalic, propionic, salicylic, acetyl-salicylic and tartaric. Of bulk coal-tar products anthracene, anthracene oil, carbolic acid, cresols, creosote oil, cresylic acid, naphthalene, pyridine and its salts remain subject to license. Penicillin, borax, boric acid, caproic acid, uranium compounds and other radio-active materials, ethyl silicate, dimethylamine, and paraphenetidine have been added to the list of chemical products exportable only under a license which usually will not be granted.

The new list of products requiring an export license has obviously been drawn up with an eye to the demands of the home market and in particular to the needs of priority consumers like agriculture and housebuilders. Defence considerations account for the inclusion of radio-active materials in the list, and the need to preserve the country's meager dollar resources is responsible for the imposition of a license demand on borax and boric acid

How the Process Industries can profit from war uses of WORTHINGTON STEAM-JET EJECTORS

Four-stage condensing ejector, typical of four- and five-stage units used for blood plasma, penicillin, and numerous other high vacuum drying and distillation processes at pressures below 1 mm. Hg abs.

Three-stage condensing unit for intermediate vacuum applications, in the range from 10 mm. to 1 mm. Hg abs.



Three-stage condensing unit constructed of acid-resisting materials for handling highly corrosive vapors. Available in porcelain and/or Karbate in single and multi-stage units.

10", 12", 16" single-stage ejectors for handling 850° F. vapors in Houdry 100-octane aviation gasoline cracking plants.

A glance through the following representative list of war products, processes and services which utilize Worthington Steam-Jet Ejectors to full advantage for their vacuum requirements will suggest that Worthington can also meet your demands:

U.S. Navy and Maritime Commission. Atomic bombs. Explosives including toluol for TNT. Chemical warfare products. 100-octane aviation gasoline, styrene, butadiene, and synthetic rubber. Plexiglas and other plastics. Rayon and nylon. Synthetic resins and dyes. Pharmaceutical products including vitamins, DDT insecticide, blood plasma, penicillin and streptomycin.

WORTHINGTON HAS THE LINE AND THE EXPERIENCE YOU NEED

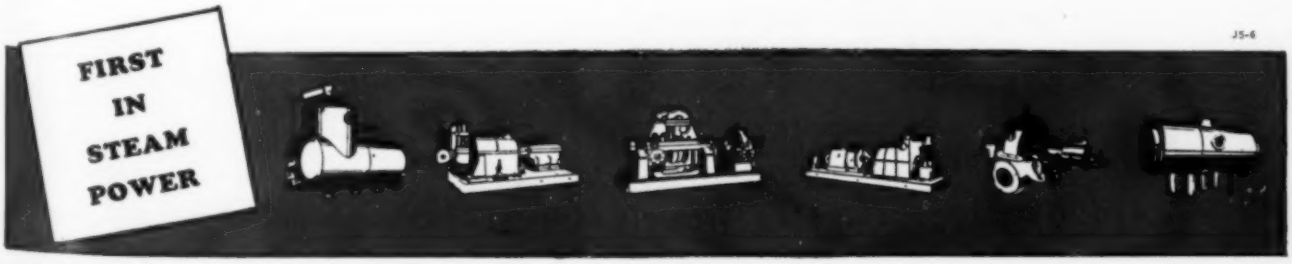
No two of the above war production jobs were alike . . . yet Worthington, through engineering ability and breadth of line, was able to meet all requirements. Application to your peace-time needs will likewise be facilitated by Worthington's experience and wide range of Steam-Jet Ejectors in single and multiple stages, condensing or non-condensing, of standard or special corrosion-resistant materials.

Whatever your vacuum requirements, from atmospheric down to 150 microns absolute pressure, Worthington can give you the benefit of its war-proved line and experience.

For further proof that in the Steam-Jet Ejector field, *there's more worth in Worthington*, write for literature, stating your vacuum requirements. *Worthington Pump and Machinery Corporation, Harrison, N. J.*

WORTHINGTON

J5-6



ARE BAKER TRUCKS MAKING SAVINGS FOR YOUR COMPETITORS

—that you are missing?

In the days of keen competition just ahead, are you prepared with the most efficient, cost-reducing material handling equipment? Look over these actual case histories. There are many more of them. In fact, every Baker truck sold quickly pays for itself out of savings.

A large aircraft producer saves time by delivering cutting oils to machines with this mobile "service station" on a Baker Truck.

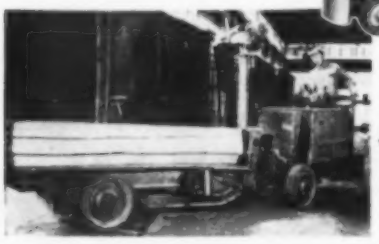
A printer and publisher saves thousands of dollars annually in warehouse rentals by tiering stock with a Baker Truck.

A stove manufacturer reduced handling costs from 35¢ to 4¢ per ton on a single operation. Overall costs were reduced 75%.

A company saves $7,956.00 per year on handling costs in one of its warehouses with a system using a Baker Truck.

Carloading costs for one plant were reduced 25¢ per ton or $12.50 per car, releasing 7 men for other jobs.

A stevedoring company moves 18 crated motor cars per hour from lighter to pier bulkhead —saves 20% on handling costs.



This Baker Articulated Sheet Handler loads 200 tons of large sheets per hour and saves a steel mill $4.30 per ton.

The Baker Material Handling Engineer can show you how similar savings may apply to your plant. Phone our nearest agent—or write us direct.

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In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

(imported exclusively from U.S.A.). A preference in exports is given to articles whose value includes a large proportion of wages and which do not take up much space in transport, for shortage of shipping is still the principal obstacle to an expansion of sales in foreign markets but this situation may improve.

A number of financial and commercial agreements have been concluded recently between the British Government and countries in western and northern Europe, and the creation of stable currency conditions has certainly a most beneficial effect on trade in general. Chemical manufacturers, however, note that the exchange rates fixed soon after the liberation do not in all cases meet the actual price relation. The French franc is generally considered to be overvalued, with the result that sales of British chemicals in France are easy, but in other countries the opposite experience is encountered. Moreover, supplies from other countries, and more particularly from the United States, are said to be offered at cheaper prices than British goods in some European markets. As long as the present shortage of supplies lasts, price considerations do not count, however, and the inflow of export orders still equals and exceeds the present export capacity of British chemical manufacturers.

DISPOSAL OF PLANTS

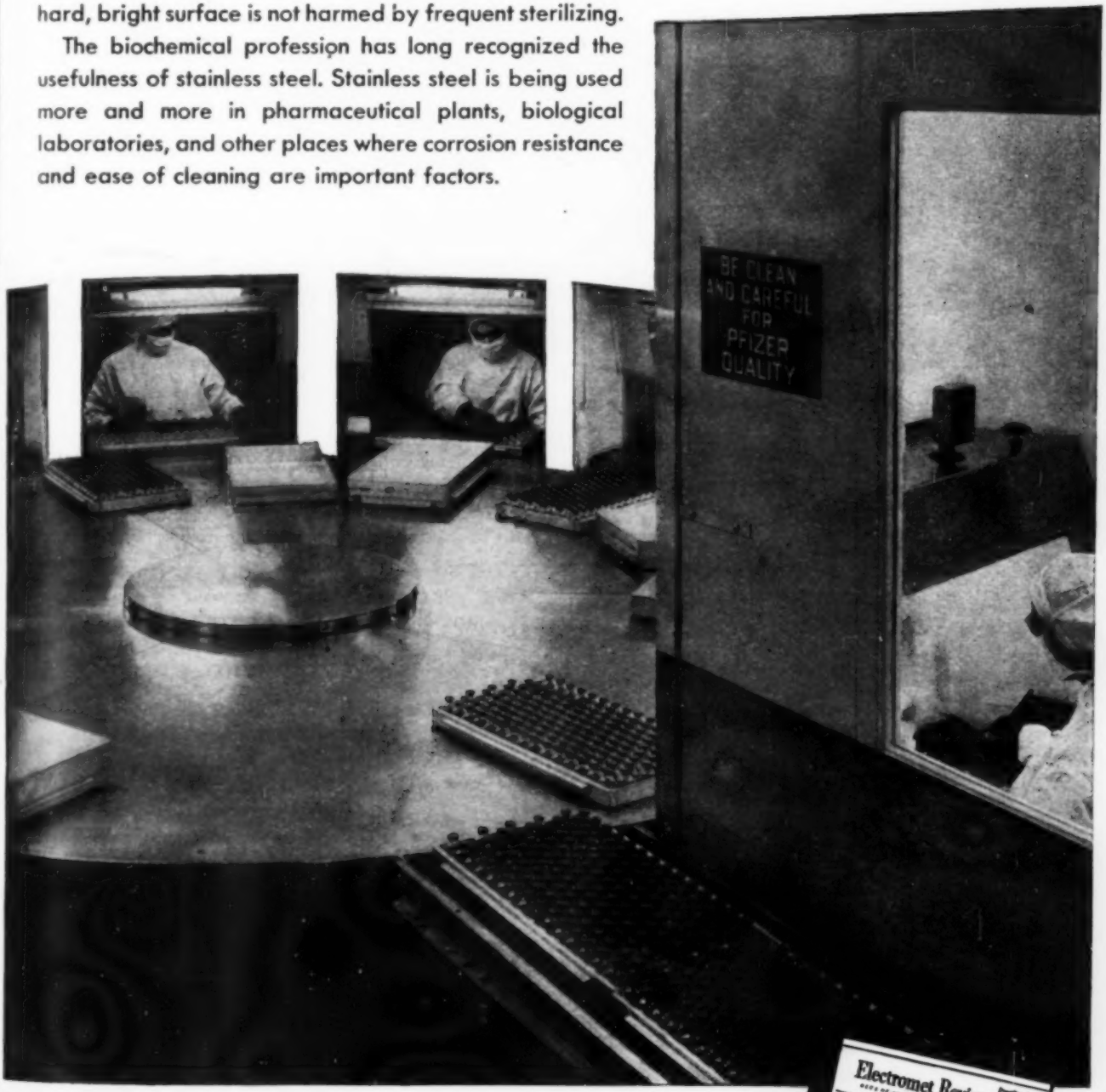
The disposal of British government-owned war factories to private firms has brought an interesting new development to light. Most of these plants are suited to engineering rather than to chemical processes and are consequently bought by firms who wish to develop engineering and metallurgical activities. Courtaulds, the rayon producer, has acquired a former aircraft factory in Lancashire for making textile machinery for its own use, while Imperial Chemical Industries has bought a plant at Swansea (South Wales) for the manufacture of wrought light alloys. Other chemical firms also prefer to install facilities for the production of equipment and apparatus since there is some doubt whether engineering and construction firms working for a machinery starved home and export market and preoccupied with the housing program will be able to give much attention to routine plant equipment business.

Reference has been made in these notes occasionally to the formation of trade associations during the war. Some of these were set up as producers' organizations pure and proper, others were intended to aid government departments in their consultations with industry or for such specific purposes as the disposal of surplus stocks and the equitable distribution of limited imports of scarce materials. The Society of British Paint Manufacturers which has now been formed by a number of leading paint firms belongs to a new category of trade associations, for its declared aim is to resist monopolistic tendencies of restraint on material, to resist at all times interference with free enterprise, and to establish good labor relations. The Society is going to form consumer divisions and wants to maintain liaison with consuming interests. The front is thus clearly directed against the producers of paint raw materials who are apparently suspected of

Stainless Steel Helps Keep Penicillin Pure

Masks, sterilized garments, ultra-violet lights, and easily sterilized equipment are some of the precautions taken in this penicillin plant. And stainless steel is chosen for much of the equipment — like this turntable — because its hard, bright surface is not harmed by frequent sterilizing.

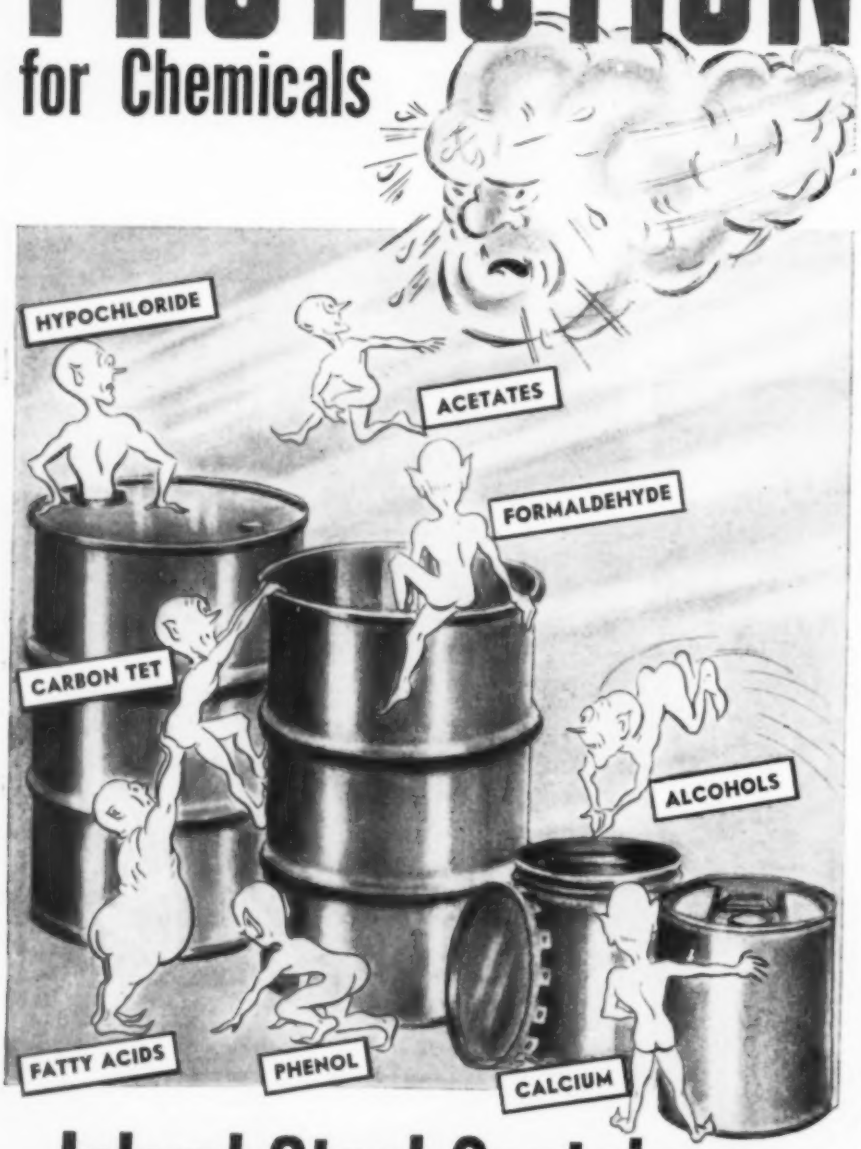
The biochemical profession has long recognized the usefulness of stainless steel. Stainless steel is being used more and more in pharmaceutical plants, biological laboratories, and other places where corrosion resistance and ease of cleaning are important factors.



Other interesting uses of stainless steel are described in ELECTROMET REVIEW, published by ELECTRO METALLURGICAL COMPANY, the Unit of UNION CARBIDE AND CARBON CORPORATION that produces alloys for making steel. If you need this publication, send your name on your business letterhead to ELECTRO METALLURGICAL COMPANY, Room 328, 30 East 42nd Street, New York 17, N. Y.

BUY AND HOLD UNITED STATES VICTORY BONDS AND STAMPS

PROTECTION
for Chemicals



Inland Steel Containers

. . . safest, sturdiest, and most convenient shipping containers for chemicals — withstand rough handling, no leakage, no spoilage; dampness and fumes do not penetrate the steel container.

Available in a wide variety of sizes and styles best suited to the product. Convenient openings make filling easy and airtight reseal-ing after opening practical.

INLAND STEEL CONTAINER CO.
Container Specialists
6532 S. MENARD AVE., CHICAGO 38, ILLINOIS
Plants at: Chicago • New Orleans • Jersey City

monopolistic designs. Chemical manufac turers in Britain may indeed generall watch the prices of their raw material with rather more attention than was th rule in wartime, for costs matter again Paint manufacturers who rely on a severel contested export market for a good par of their output have special reason to de fend themselves against exorbitant price demands.

ARABIAN AMERICAN OIL CO.'S REFINERY NOW OPERATING

One of the most unusual war project undertaken by the petroleum industry, th 50,000 bbl.-per-day refinery of the Arabia American Oil Co., subsidiary of Standar Oil of California, at Ras Tanura in Saud Arabia, is now approaching full operating capacity. Although work on the refiner got under way only in mid-November o 1944, sufficient progress had been mad by October, 1945, in spite of very difficul working conditions, to permit operation at 50 percent ultimate capacity. Crud delivered to the refinery is stabilized a Dhahran, location of the first producing field and present headquarters of th Arabian American Oil Co., to remov hydrogen sulphide.

Principal source of crude will be th Dammam field. Straight run gasoline o the new refinery will be reformed in tw thermal reformers. Other refinery equip ment necessary to produce motor gasoline diesel oil and fuel oil is being provided Special problems in the project resulte from the facts that the refinery is 12,00 miles in any direction from San Francisco home office of the company, and tha sand and rock were the only materials o construction available; everything else ha to be imported.

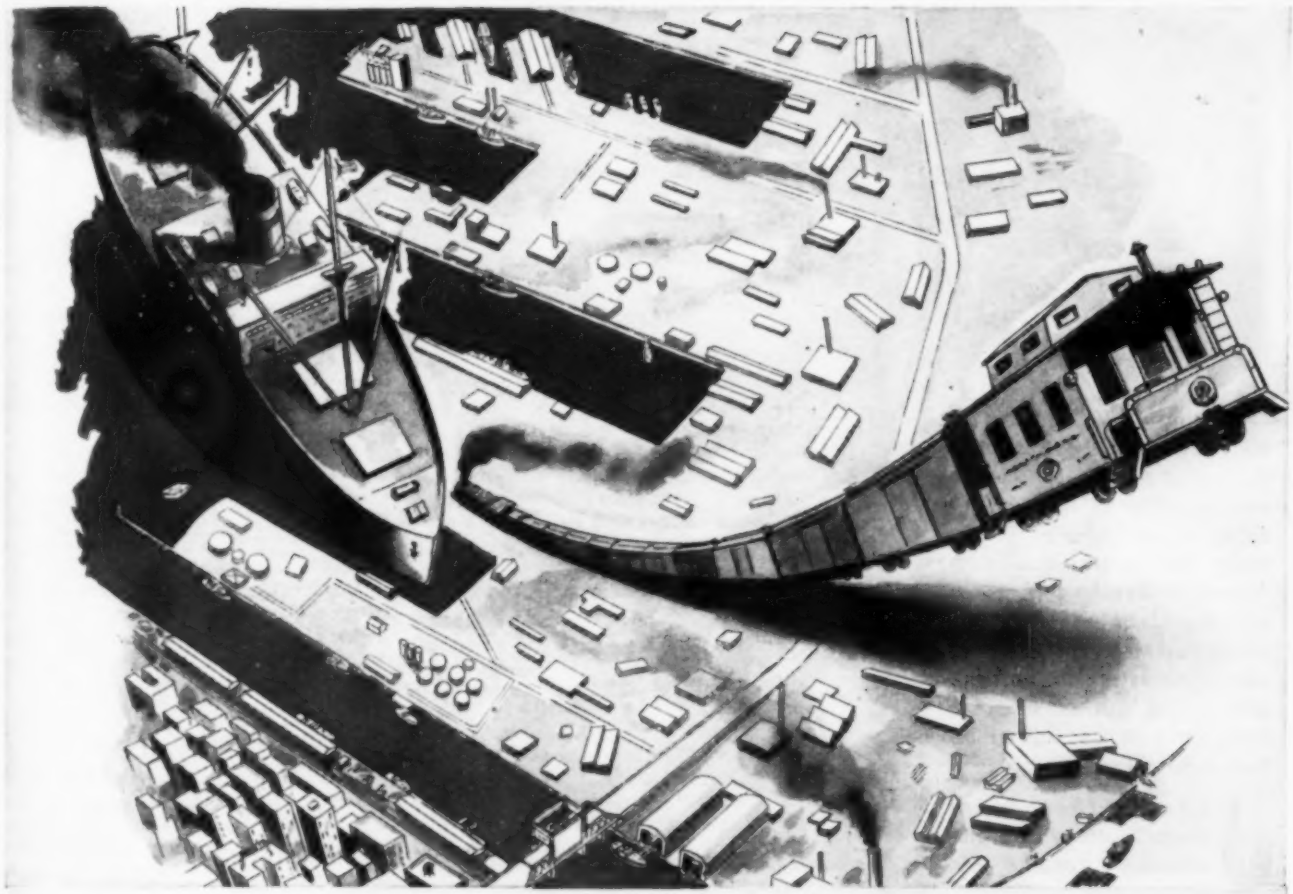
NEW CELLOPHANE PLANT IN CONCEPCION, CHILE

Expected to go into operation in th last quarter of this year, a plant for the production of cellophane is nearing com pletion at Concepcion, Chile. Import data show that in 1938–1943 an average o 105,555 lb. of cellophane entered Chil of which the United States supplied a average of 61,000 lb., the remainder com ing chiefly from Japan, Germany, Great Britain, and France. The annual capacit of the new plant is 80,000 lb.

All raw materials required for the manu facture of this cellophane, except coloring materials, will be of Chilian origin. Cotton waste from textile mills in the vicinity or a variety of pine growing abundantly in the region of Concepcion probably will be used to make the cellulose.

J. V. GUNDY MADE DIRECTOR OF CHARLES TENNANT & CO.

Announcement has been made of the appointment of J. V. Gundy as director of Charles Tennant & Co., Ltd., of Canada This is one of the Tennant group of com panies, the parent company having been established in England in 1797. Mr Gundy is a graduate of the University of Toronto in chemical engineering and has been with the Canadian company since its inception, as manager and later as treasurer.



Rails Meet Tidewater to Provide Exceptional Shipping Facilities for Your Plant in TACOMA

Four Railroads—plus a Municipal Belt Line

• Four transcontinental railroads meet tidewater in Tacoma — Northern Pacific, Great Northern, Union Pacific and the Chicago, Milwaukee, St. Paul and Pacific. The Tacoma Municipal Belt Line — operating between all railroads, marine terminals and the principal industrial district—provides free switching service on line-haul traffic. The city is served by 53 motor freight lines operating to all parts of the country.

Locate Here—on an Excellent Harbor

• Commodities may be water-shipped from Tacoma to East Coast ports cheaper than shipping by rail from many mid-western points. On Tacoma's fine sheltered harbor are modern public and private terminals providing both open pier and transit shed installations. In normal times, some 40 steamship lines, plying to all parts of the world, make Tacoma a regular port of call. Large industrial sites, near deep water, are for sale at low prices by the Port of Tacoma Industrial district.

Check Tacoma's Many Other Advantages, Too

• Lowest power rates—pure water—nearby raw materials —favorable taxes—ideal climate for year-round production. These are just a few of the features Tacoma offers. Because this modern industrial city is already center of the electro chemical and metallurgical industry on the Pacific Coast, a ready supply of basic processed materials is available here—a "pool" of skilled workers as well! Check these advantages. And remember there may be others of importance to your particular operation. For further information on any point, write or wire: The Tacoma Chamber of Commerce, Tacoma 1, Washington.

Locate Your Plant in

Tacoma

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Home of the Nation's Lowest Power Rates!

Tube-Cleaning Formula

Solving 80% to 90% of all tube-cleaning problems is easy. It can be done without recourse to special designs or equipment—if you have the right formula. A review of literally thousands of tube-cleaning problems presented to Wilson Engineers shows that in eight or nine cases out of ten, the problem can be solved by this simple formula:

1 ***Choose the proper motor, cutter-head and accessory for the job.***

2 ***Plan ahead — it will assure you of having enough of the right kind of tube cleaning apparatus on hand when you need it. You may save valuable down-time this way.***

It's easy to apply this formula when you have a copy of the Wilson Tube Cleaners Check List. It will help you choose the correct Wilson motor, cutter-head, brush, flexible shaft or other accessory to assemble a tube cleaner that will do your job —and do it quickly. In addition it contains a list of valuable suggestions on planning ahead, and maintenance and operation of tube cleaners. *Your copy will be sent on request.*

MODERN TUBE-CLEANERS FOR THE PROBLEMS OF TODAY.

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CURTAILMENT OF IMPORTS FAVORED DEVELOPMENT OF CHEMICAL PRODUCTION IN SOUTH AFRICA

Special Correspondence

THE FIRST public water filtration company has been formed in South Africa. It owns a number of patents dealing with the filtration and purification of water. It is to specialize in the development, manufacture and supply of water softening and purification equipment. Specialized equipment, including rate of flow controllers, accurate automatic proportionate gravity dosing equipment, etc., can not only be manufactured locally, but it is claimed that the final product is at least equal in performance to the imported article. Fifteen inventions are now being used in these water purification plants, and much of this specialized equipment is also patented overseas. The company is paying special attention to the manufacture of equipment and plant capable of meeting the needs of water problems peculiar to South African conditions.

A new vacuum and pressure plant has been erected at Roodepoort, Transvaal, for the impregnation of timber with Wolman Tanalith salt. It is equipped with the latest type of vacuum and hydraulic pressure pumps, which are designed to create the treatment conditions necessary, hydraulic pressure of 200 lb. per sq.in. normally being used. The main impregnation vessels consist of two cylinders, each 70 ft. long and 6 ft. diameter. The plant capacity is 4 to 4½ million cu.ft. of timber per annum. The average treating cycle per charge for normal building timbers for sizes up to 10 in. by 5 in. is about four hours. The preservative used is compounded of several toxic, metallic and water-soluble salts. It has a good degree of fixation in the wood. It is normally used in a 2 percent water solution. For protection of timbers against insect attack it has been found that a concentration of 0.3 lb. of the salts per cu.ft. of sapwood gives adequate protection. This results in a volumetric absorption of 1.5 gal. per cu.ft. of sapwood. Similar treatment is being given in a plant in Cape Town.

South African exports of naphthalene are still increasing, as considerable quantities have been sent to the United States. It is possible that this byproduct of the Iron and Steel Corp. in Pretoria will be exported in even larger quantities in the years to come. The compressed naphthalene has been used in South Africa to protect local wool, hides and skins. The steel works also has been selling quantities of tar for road making, and now that an extensive program of road building is planned by the National Roads Board the demand for tar will be very much greater.

The Cape herb, buchu, an old established remedy has seen a revived demand during the war. Quantities have been exported to Britain and the United States, the latter taking the larger amount. The prewar price of about 25c. soared to over 75c. American prices generally are lower than those paid in London, but the heavier American purchasing compensates for that. Small consignments have been sold to Australia and New Zealand. The South African market for the herb is small, supplies being sold to chemists and to some distilleries to make a medicinal buchu brandy.

In the near future there may be a need to re-assess the possibilities of the local chemical industry, for many processes that could be carried out profitably under a war economy might not be so successful under a system of free competition with other producing countries. The war undoubtedly stimulated the South African chemical industry, which started production of a number of chemical manufactures that previously were imported. In some cases the South African factories were subsidiaries of American or British concerns, and some with German connections are still using German patents although no longer under German control. Apart from heavy chemicals, many of these smaller firms are producing distemper cures and worm specifics for dogs, skin ointments and cattle medicines.

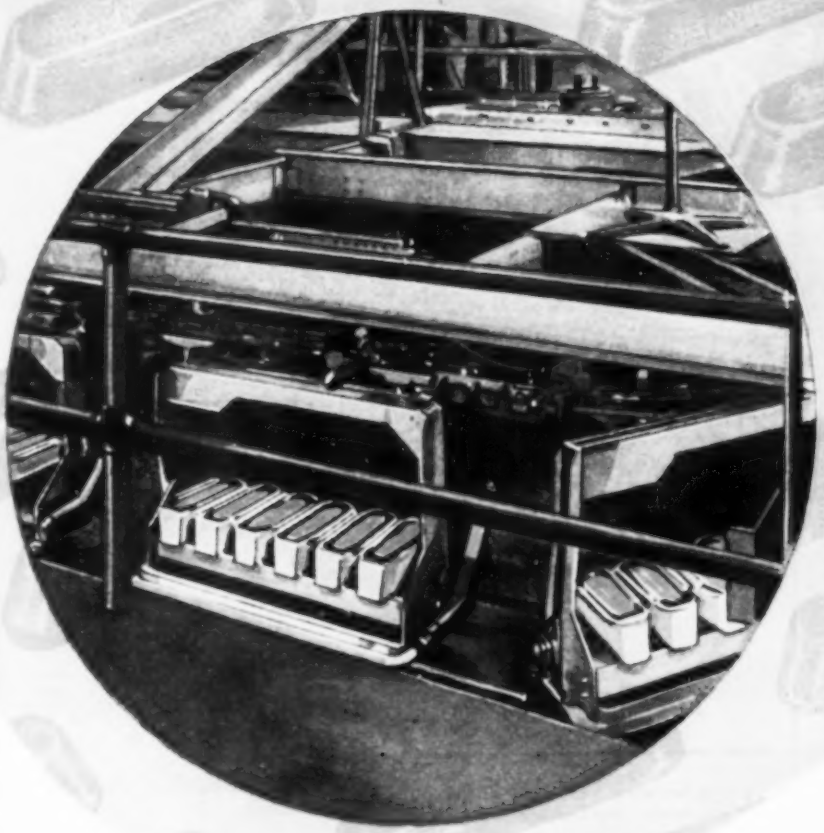
GRAPHITE MINED

Graphite mined in South West Africa is being concentrated at a factory in Mafeking, Cape Town. Before this concentration was done, much of this graphite was used in South Africa for various industrial purposes, but it is only since the war that graphite treated in the Union has been concentrated sufficiently for the production of greases, lubricants, paints and other needs, and for use in crucibles and batteries. During the war it was most difficult to maintain the supplies of imported high-grade graphite, and thus local resources had to be developed. The local product has over 85 percent graphite carbon.

The extraction of vitamin-rich oil from the livers of sharks and other big fish is now an important industry in South Africa. Many of the products have been exported to Britain and other countries where there is an urgent need for vitamin supplements in the normal rations. Much of this research work has been done by the chemistry staff of the Cape Town University but the work is now on a commercial basis.

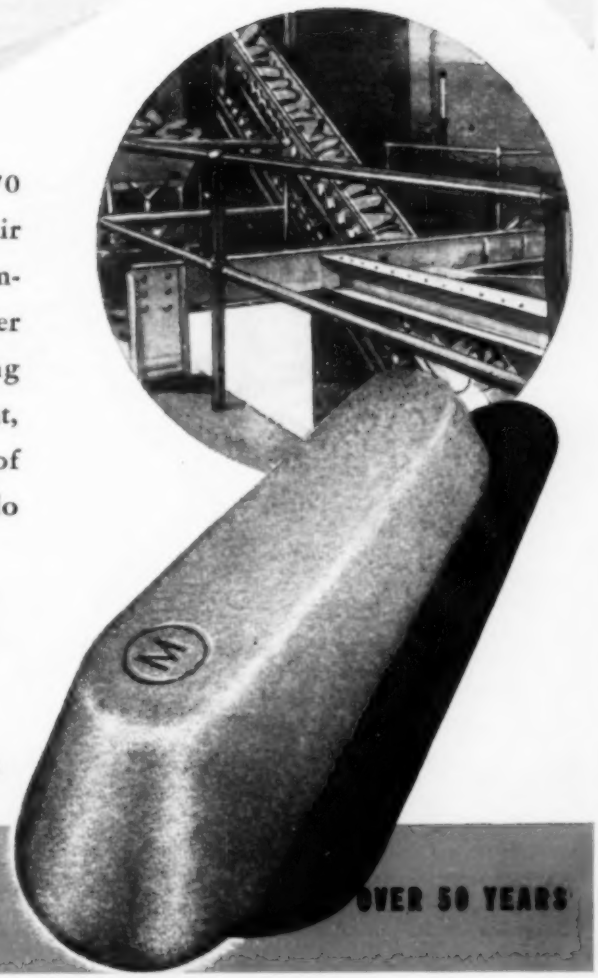
A Johannesburg firm is now manufacturing scientific glassware in its laboratory. Before the war research workers and chemists could buy such glassware at "throw out" prices from Europe, where these industries were often subsidized. Laboratory glassware can be produced in South Africa, but test tubes, ampoules, and flasks still must be imported from America and England. Local manufacturers believe they can hold the local market for blown glassware. Glass pipes also may be made for the food canning industries and for a number of other purposes.

A comparatively recent development in South Africa is the use of skimmed milk to make casein glue, a result of the wartime demand for adhesives and glues. In the beginning local consumers had to be convinced that South African casein glues were equal to such glues previously im-



HYDRAULIC-DRIVE CONVEYOR HANDLES 420 INGOTS CONTINUOUSLY

This Hydraulic Drive Conveyor system comprises 70 units of six molds each. Seventeen minutes of air cooling is followed by water cooling with mold temperatures properly regulated. This assures proper grain structure in all Michigan Smelting and Refining ingots. The very finest in mechanical equipment, plus over 50 years of experience in the refining of non-ferrous alloys, is available to you when you do business with this organization.



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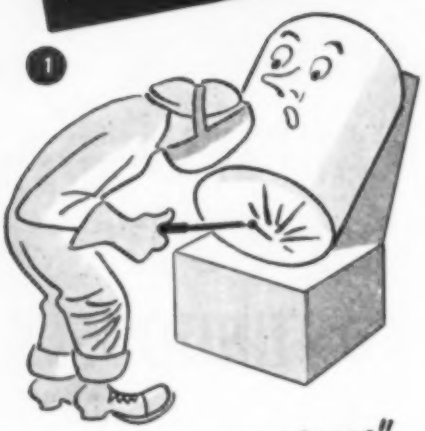

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"Shine 'em up"

"Inspect my seams again, pal"

1. Not too much heat — not too little in the welding arc! Stainless steel is tricky to fabricate. Our experienced welders know that improper welding temperature reduces corrosion resistance at the seams. Blickman-controlled welding procedures give you sound, corrosion resistant welds.

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ported. This difficulty was gradually overcome and restrictions on imports of glue caused manufacturers to depend more on the local product. Cold water glues, slab, granulated and powdered glue are all part of the range, each glue with a definite purpose. The government was provided with a glue for munition boxes and a special glue was also designed for corrugated containers.

EQUIPMENT NEEDS

South African chemical industry will be vitally affected by decisions which it is expected will be taken in Britain and America regarding the export of industrial machinery. Local industries fear that both these countries may be reluctant to permit such imports on a desirable scale as that would enable the local chemical industry to become a keener competitor. It is not likely, however, that the local industry will calmly submit to elimination for the benefit of other countries, and if there is difficulty in getting machinery higher tariffs may be imposed to protect local manufacture. Actually South Africa provides a very good market for American chemical manufacturing machinery of many types.

Among new chemical firms started in South Africa during 1945 are manufacturers of quick-drying lacquers, thinners, clear varnishes, varnish stains, stencil inks and insulating varnish. The stencil inks are made in liquid and block form, the blocks being packed in cardboard containers.

Oil-expeller machines are being made in Johannesburg. The nuts, which are deposited in a steam-jacketed cooking kettle fitted with a stirrer, are compressed through a steel barrel lined with rotating worms. The oil exudes through slots in the barrel and flows into a container, the residue being deposited at the end of the barrel. The machine can be used for extracting vegetable oils such as copra, soybean, palm kernels, ground nuts, etc. and for all purposes involving the extraction of liquid oil from mushy fibrous matter. Prices are claimed to be competitive.

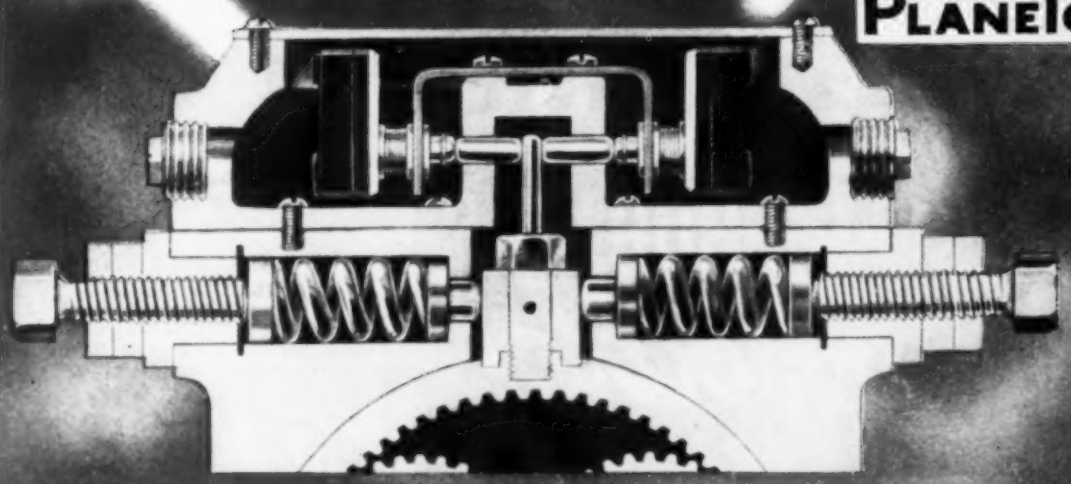
A considerable range of floor and other polishes is produced in South Africa, and not only are new factories entering this line of production but the established concerns are increasing output and extending the range of their products. A single firm in Johannesburg recently announced that it is now manufacturing light, dark, red, black, and white floor polish, which is packed in tins varying in weight from one to 32 lb. At the same time such firms often make liquid metal polish for chromium and silver and cleansers in tablet form for windows and in paste and powder form for general use.

BRAZIL CUTS DOWN IMPORTS OF ASH AND CAUSTIC

Enlarged domestic production of alkalis is indicated by Brazilian import statistics which report that only 35,809 metric tons of caustic soda entered Brazil in 1944 compared with imports of 60,254 metric tons in 1943. However, of the arrivals in 1943 only a little more than 56 percent came from the United States while in 1944 the percentage rose to nearly 84. Imports

Like Magic

PLANETORQUE



automatically and positively GIVES OVERLOAD PROTECTION to driven machinery and MOTOREDUCER .. *instantly*

The "exclusive" Philadelphia **Planetorque**, is a feature that can be incorporated into any Philadelphia **MotoReduceR** (as seen from the illustrations herewith).

By direct *mechanical action* of the overload, the motor current is *automatically* and *instantly cut-off, as soon as a predetermined load limit is reached.* This action is *quicker* and *more positive* than electrical thermal relays. With "fuse protection," the fuses must be selected to carry the starting current of motors; therefore, protection during the running period is not adequate. Incidentally, the **Planetorque** can be cut out during the starting period, by merely holding-down the starting button, and upon release of said button, it becomes operative again during the running period. To re-start the **Planetorque** after it has cut-off from dangerous overload, merely remove the excessive load —a big time and money-saving feature.

The **Planetorque** is ideal for Stoker Drives, Crushers, Mixers, Rolls, Pulverizers and a "hundred and one" other machines. Write for Catalog MR-45.

Showing a Philadelphia Horizontal **MotoReduceR** with the small, simple neat **Planetorque** installed.

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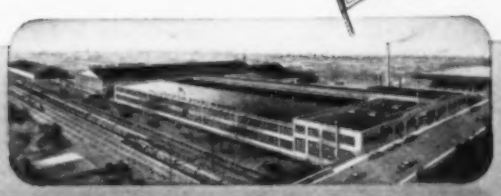

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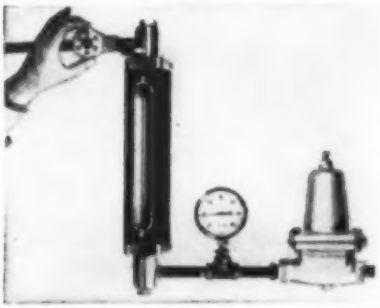


Install an Ansul SO_2 System and get these Proved Advantages

FINGER-TIP CONTROL—Easy, positive, finger-tip control providing extreme accuracy for reaction or adjustment of pH.

GREATER ECONOMY—Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.

HIGHER PURITY—Elimination of impurities inherent in burner gases (Ansul Liquid SO_2 is 99.9+% [by weight] PURE).

GREATER SOLUBILITY—Solubility in water is 4 to 5 times greater than SO_2 from burner gas.

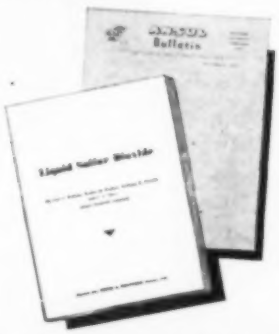
Easy to Install... Easy to Operate

WRITE THE ANSUL TECHNICAL STAFF FOR FURTHER INFORMATION

LIQUID Sulfur Dioxide ANSUL

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

*REG. U. S. PAT. OFF.

Send for Bulletin 020.1, "A Comparison of Ansul SO_2 and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

WRITE: Dept. B.

ANSUL CHEMICAL COMPANY, MARINETTE, WIS.

Eastern Office: 60 E. 42nd St., New York City

of soda ash dropped from 43,838 metric tons in 1943 to 18,238 metric tons in 1944, the United States contributions having been 18,188 metric tons and 10,189 metric tons respectively.

SPAIN INCREASES PRODUCTION OF ACETYLENE AND OXYGEN

PRODUCTION of oxygen and acetylene has been increased in Spain by Sociedad Espanola de Carburos Metalicos to provide gas for welding and to consume 80 percent of the national carbide production. The company plans to establish plants in Granada, La Coruna, Pamplona, and Vittoria. A new plant of the company began operations last June in Las Palmas, Canary Islands and the Seville factory has been working since last May.

NATURAL RUBBER STOCKS IN NETHERLANDS INDIES

ACCORDING to the Netherlands Information Service, a cargo of 8,500 tons of natural rubber, the first such shipments since the early months of the Pacific War, will shortly be on its way to the United States. The report says the rubber will be loaded aboard the American Victory ship Canton Victory which is at Tandjong Priok which it Batavia's port in Java. As the report was published in October the shipment should be well on its way by now. This rubber was in the possession of the Japanese and pending determination of ownership it probably will be consigned to the Foreign Economic Administration with financial terms to be negotiated later between FEA and Netherlands authorities in Washington.

CORNING GLASS WORKS INVESTS IN CHILEAN COMPANY

PURCHASE of a substantial interest in Cristalerias de Chile, largest glass manufacturer in Chile, has been announced by William H. Curtiss, vice president and secretary of Corning. He emphasized that majority control would be retained by the original owners in South America. About two years ago, Corning acquired a minority interest in Argentina's leading glass concern, Cristalerias Rigolleau of Buenos Aires. Last fall a comparable investment was made in Brazil's foremost glass company, Vidraria Santa Marina of Sao Paulo.

POLISH FERTILIZER PLANTS SUFFERED WAR DAMAGE

RECENT production of soda compounds in Poland is said to have been sufficiently large to permit exports to Sweden and press advices say the chemical industry in that country suffered less war damage than had been expected. However, fertilizer plants were not so fortunate and the government has allocated 90,000,000,000 zlotys for restoration of the plant at Moscice and for repairs and improvements to the plants at Chyrow and Chorzow. Arrangements have been made for the importation of 40,000 tons of apatite from the Soviet Union.

GRINNELL *for*

PIPE PREFABRICATION

Complete facilities for the fabrication of every type of piping . . . protested before delivery.

PIPE SUSPENSION

Constant-Support Hangers for constant support of piping in all "hot" and "cold" positions . . . full safety factor of the supported system always maintained . . . individually calibrated . . . minimum headroom required.

Engineered Spring Hangers . . . stock hangers for loads ranging from 84 lbs. to 4700 lbs. Change in supporting force of hanger held below 12½% in ½" vertical travel of piping.

Years of experience in interpreting piping requirements, strategically located pipe fabricating plants, and the most complete line of pipe hangers . . . these are the reasons why Grinnell supplies piping and hangers exactly suited to the individual layout. GRINNELL COMPANY, INC. Executive Offices, Providence 1, R. I. Branch Warehouses in principal cities. Pipe Fabrication Plants: Providence, R. I., Atlanta, Ga., Warren, Ohio.

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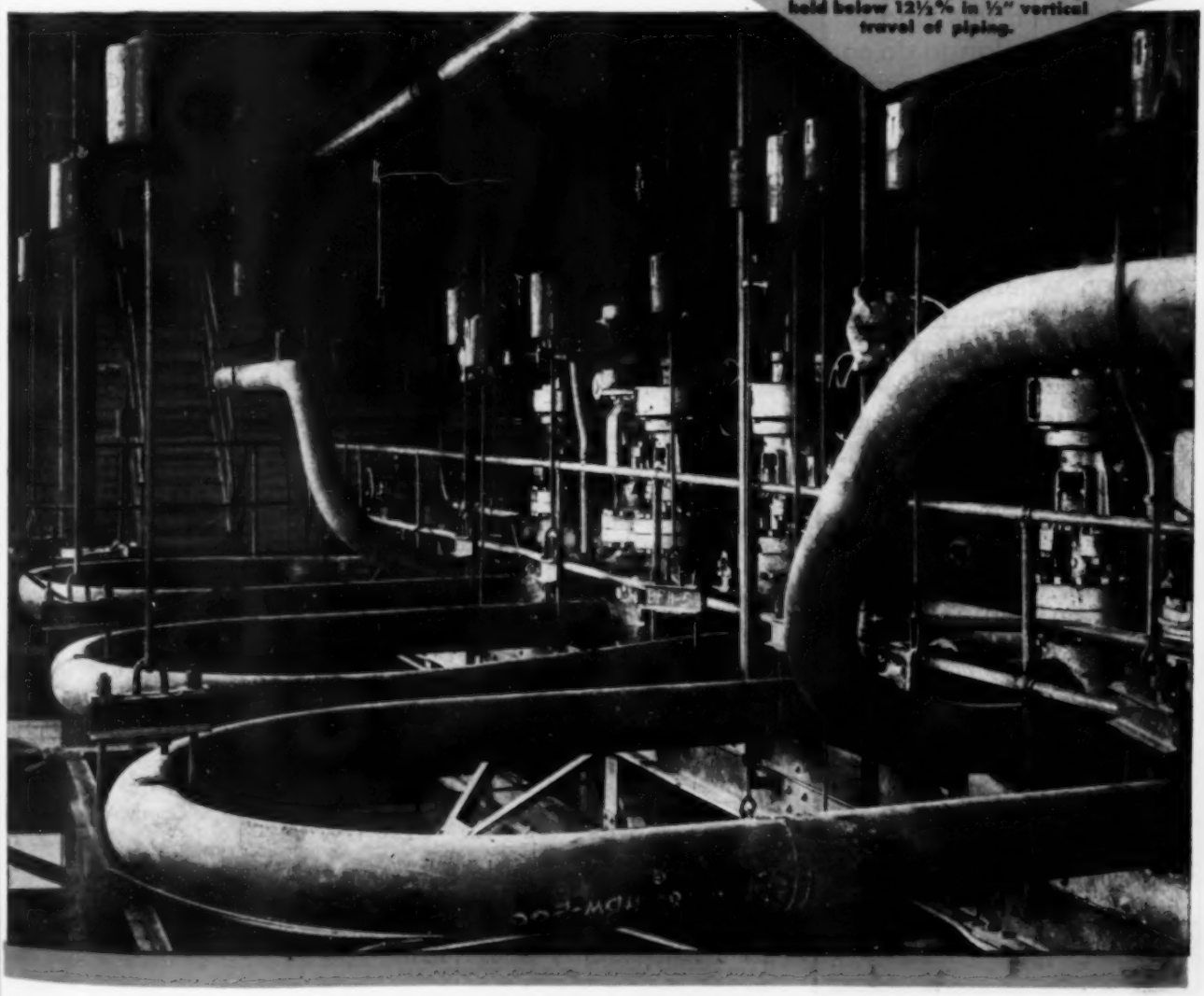

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Pneumatic Conveying is the modern answer to many problems which develop in the handling of fine, dry materials, as a product or as a by-product of a manufacturing process. If you are now working with this kind of material, or plan to do so in the future, and would like to determine the advantages which pneumatic conveying offers you, we will be glad to make available our Testing Laboratory, wherein Capacity, Power Consumption, Breakage through Handling, and Allowable Moisture Content of your material can be analyzed. Our method of pre-testing eliminates guess-work, gives you concrete facts on which to judge the effectiveness of this type of conveying.

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Conveyor Specialists — Manufacturers of National Steam Pneumatic Ash Conveyors and National ChipVeyors for Metal Turnings.

GERMAN CHEMICAL INDUSTRIES

The Office of the Publication Board, Department of Commerce, has released a number of reports on Germany's wartime industries. In this department *Chem. & Met.* is presenting abstracts of some of these which are of chemical engineering interest.

SYNTHETIC RUBBERS AND INGREDIENTS

THREE general classes of bunas were being made in Germany. The principal one, accounting for most of the production was the buna S—butadiene/styrene emulsion copolymer type. The others were the oil-resistant buna N emulsion copolymers of butadiene and acrylonitrile, and the numbered bunas, sodium or potassium polymers of butadiene. Latices of the first two classes were also being made and used in rubber products manufacture. The Germans had made the American rubbers, butyl and Neoprene, only on a restricted experimental basis.

BUNA S RUBBERS

There were three of these in common use: buna S, S-3 and SS. Several, such as SSE, SSGF, SR, and SW, were made in limited quantity for special purposes. The principal bunas were made by a continuous process at approximately 50 deg. C. and 60 percent conversion.

It will be seen from the Defo numbers* that these rubbers were far tougher than American GR-S. This necessitated an extra heat-softening operation prior to compounding and mixing.

There is no supporting evidence that this tougher and more difficult processing German rubber imparted superior quality to tires or other rubber articles. Brief descriptions of these bunas and their average Defo plasticity values follow:

Buna S—Defo 5,000—This copolymer is made with a charging ratio of about 70 butadiene/30 styrene. The principal emulsifying agent is the soap of linseed oil fatty acid. Buna S was formerly the standard German general-purpose rubber, now largely replaced by buna S-3. (Buna S1 and buna S2 were sometimes used to distinguish between buna S as made at two different plants. They were essentially the same.)

Buna S3—Defo 3,000—Made with approximately the same charging ratio as buna S but uses paraffin fatty acids and Nekal (sodium diisobutylnaphthalene sulphonate) as emulsifiers.

This newer variety appeared to be replacing buna S. Due possibly to a lower soap content, it had better adhesion properties in the uncured state. It was reported that the improvement in building properties brought about a decrease in factory defects which in turn meant that fewer defective tires went into service, with a resultant improvement in over-all tire mileage.

A shortage of linseed oil apparently had necessitated the change to buna S3. The advantages were found after its adoption.

Buna SS—Defo 4,000—This is a high styrene rubber probably made the same as buna S except that the charging ratio is approximately 50 butadiene/50 styrene. It is superior to the low styrene rubbers in extrusion properties and therefore finds use in such stocks as beads, flaps, and many non-tire items. Inner tubes were formerly made of buna SS but had the serious shortcoming of stiffening or hardening at low temperatures with consequent loss of air. In addition to poor cold resistance the high styrene rubber has lower elasticity.

Buna SSE—Defo 2,500—Made to the same formula as the high styrene SS, but it is stabilized with OKC Resin (oxycresyl camphone) instead of the usual phenyl beta naphthylamine, and is made iron free by using special wash water. Buna SSE was developed primarily for the production of pharmaceutical goods. In tire manufacture is had been found that SSE when properly broken down produced cements of improved tackiness.

Buna SSGF—Defo 3,300—It is claimed that this special grade is odorless and does not impart taste, making it useful in the manufacture of articles for the food industry such as jar rings, closures, etc. SSGF is 50 butadiene/50 styrene polymer in which the linseed oil is replaced by paraffin fatty acid and Nekal. Oxycresyl camphone is the anti-oxidant. The latex is stripped and the rubber is washed with special care.

Buna SR—Defo 3,500—Better cold resistance than buna SS and improved tubing and calendering properties. SR contains a mixture of high and low gel rubbers. It is made by coagulating equal parts of buna S and buna R latices. Buna R is made the same as buna S except that in the last reactor the temperature is raised to about 80 deg. C. and the conversion runs to 96 percent. This results in a high gel rubber with a somewhat higher styrene content than buna S.

Buna SW—Defo 650—A polymer developed especially for cold resistance. It is so soft that it is difficult to process. Buna SW is made with a charging ratio of 90 butadiene/10 styrene using Nekal as a principal emulsifying agent.

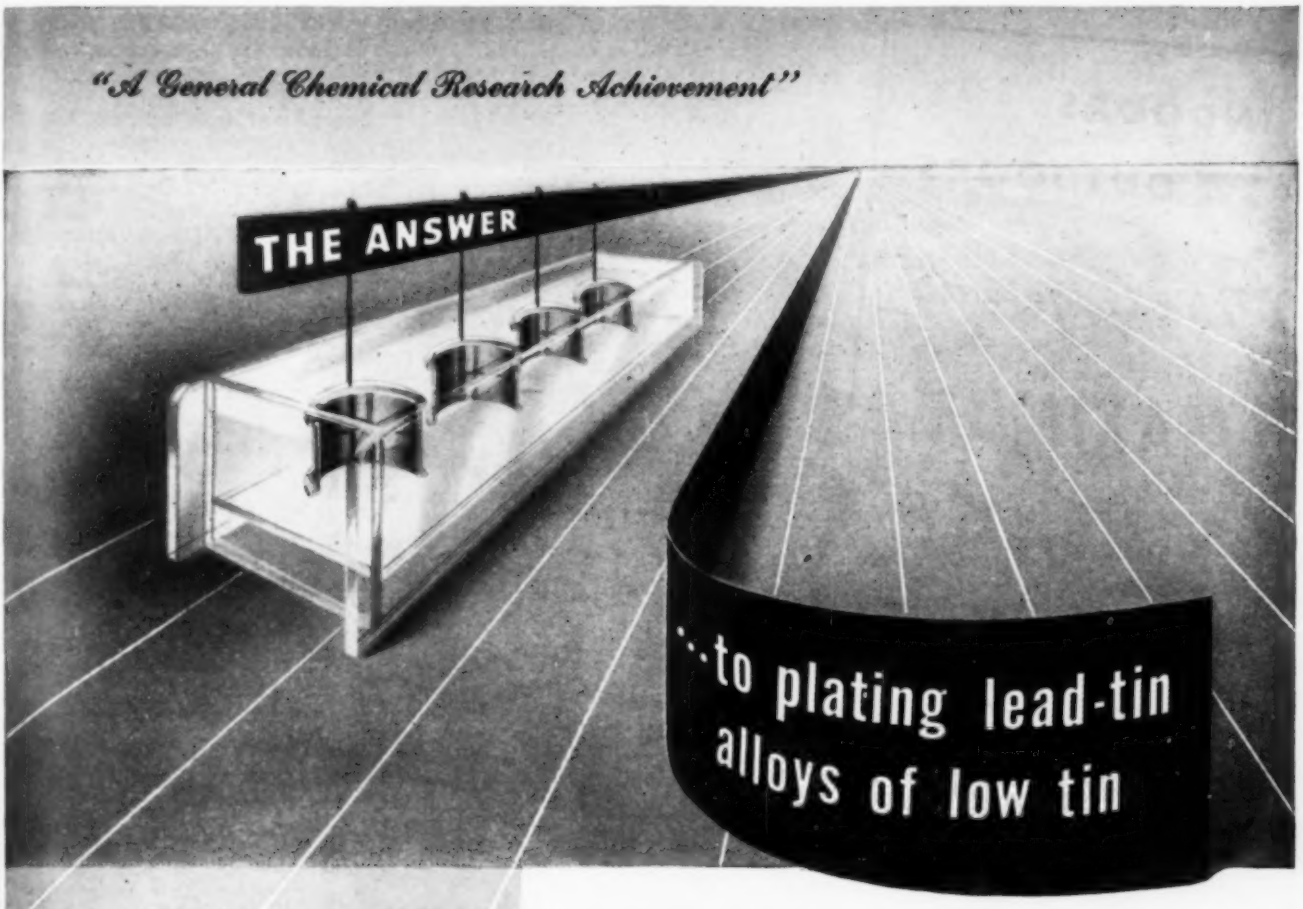
BUNA N RUBBERS

Perbunan—Defo 2,500—Perbunan is an oil resistant polymer made with a charging ratio of approximately 75 butadiene/25 acrylonitrile.

Perbunan Extra-Defo 3,200—Perbunan Extra has better oil resistance than Perbunan because of the higher nitrile con-

* The Defo test measures the fixed deformation of a buna test piece under variable loads. Test pieces 10 mm. high and 10 mm. in diameter are prepared from a composite sample of buna. The Defo number is the weight of the load in grams, required to compress the height of the test piece from 10mm. to 4 mm. in 30 sec. at a temperature of 80 deg. C. The instrument which is used in making the Defo test is known in detail. A Defo number of 500 is approximately 50 Mooney (ML-4), while a Defo number of 5,000 is above 200 Mooney (ML-4).

"A General Chemical Research Achievement"



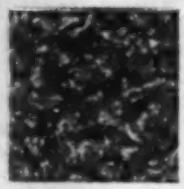


Fig. A: Lead Plating (100% Lead—0% Tin) *150 Diameters*

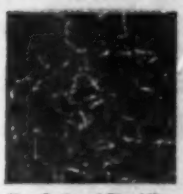


Fig. B: Lead-Tin Alloy Plating (91% Lead—9% Tin) *150 Diameters*

When tin *is* plated out simultaneously with lead from General Chemical Lead and Tin Fluoborate solutions, the lead-tin alloy plate obtained consists of a smooth, even cover in contrast to the grainy surface of the lead plate alone.

Fig. C: X-ray pattern of Lead Plating

Fig. D: X-ray pattern of Lead-Tin Alloy Plating (91% Lead—9% Tin)

Coarse grain spots in Fig. C coalesce in Fig. D to form more uniform lines, indicating finer grain structure. Only lead lines appear in both patterns since the tin atoms have entered the lead lattice to form an alloy in Fig. D.

For more than 25 years metal finishers have sought a successful means of plating lead-tin alloys in the low tin ranges. "Not feasible . . . inoperable . . . too many variables," read published reports on method after method.

Now—with the new chemical tools of General Chemical Fluorine Research—platers are achieving the "impossible."

Here's how: General Chemical *Lead* and *Tin Fluoborate solutions* are thoroughly compatible. Combined in baths using dual or alloy anodes, they plate out dense, fine-grained lead-tin alloy deposits . . . uniformly . . . simultaneously . . . and *with the tin easily controlled at low ranges!*

Thus, *in one operation* an alloy coating is produced that is harder, more wear-resistant, and has a more attractive appearance than lead plate alone. Little wonder that leaders in the bearing industry are adopting the combination fluoborate bath for lead-tin alloy plating of their products.

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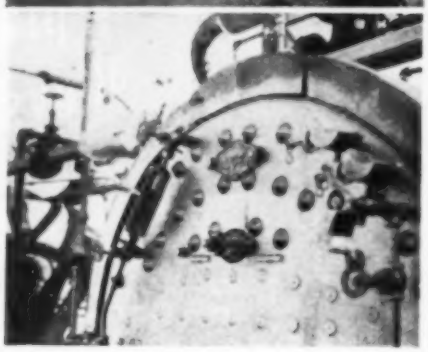
OUTDOORS

The Gage with

MAXIMUM VISIBILITY

is the Best Watch Dog



JERGUSON

The purpose of a liquid level gage is to reassure . . . or to warn, to warn through the eye. That's why it's vitally important that the gage give maximum visibility.

Without question, the JERGUSON Reflex Gage provides such visibility. The liquid in the column—any liquid—shows a dead black; the space above shows contrasting white. No better visibility can be obtained. If, however, the condition or color of liquid must be noted, we recommend our Transparent Gage, which is fitted with "see-through" glass.

Both gages are constructed of durable steel and alloy steel parts. The glass, carefully tempered, is resistant to high temperatures. And in both, the glass is installed in separate, strong strips rather than in tubular form.

JERGUSON GAGE & VALVE CO.

88 Fellsway **Somerville 45, Mass.**

REPRESENTATIVES IN PRINCIPAL CITIES

tent. The charging ratio is approximately 65 butadiene/35 acrylonitrile.

NUMBERED BUNAS

Buna 32—A viscous low molecular polymer produced from butadiene by the sodium polymerization process.

Buna 85—Defo 1,400—A potassium polymer of butadiene of higher molecular weight than buna 32. It is used particularly for the making of hard rubber with good chemical resistance and high heat stability and also has excellent electrical characteristics. Even with its low Defo hardness, it is difficult to process.

LATICES

Igetex S—The latex from which buna is obtained. It was available in 30 percent concentration (as manufactured) or concentrated to 45 percent total solids.

Igetex SS—The latex of high styrene buna SS concentrated to 45 percent total solids.

Igetex N—The latex of Perbunan in 30 percent concentration as manufactured.

Igetex NN—The latex of Perbunan Extra concentrated to approximately 45 percent total solids.

COMPOUNDING INGREDIENTS

Blacks and Other Pigments—Of the several types of blacks shown in the tire and tube formulations the principal ones are:

1. Channel black (CK3 or CK4, depending upon source) which seems to have processing properties similar to EPC. Claims are made that it is of more uniform particle size than American channel blacks, and that because of better reinforcement the abrasion resistance of synthetic stocks was improved.

2. Black P-1250 is a semi-reinforcing acetylene black used often in conjunction with CK blacks in carcass and inner tube stocks, etc., and also in conducting rubber stocks.

3. Lamp blacks were employed to some extent in tire carcasses and for special uses. So-called "heavy" lamp blacks were used in tires and light lamp blacks in many mechanical goods. There appeared to be a number of grades designated as Durex Superior, Durex-O, etc.

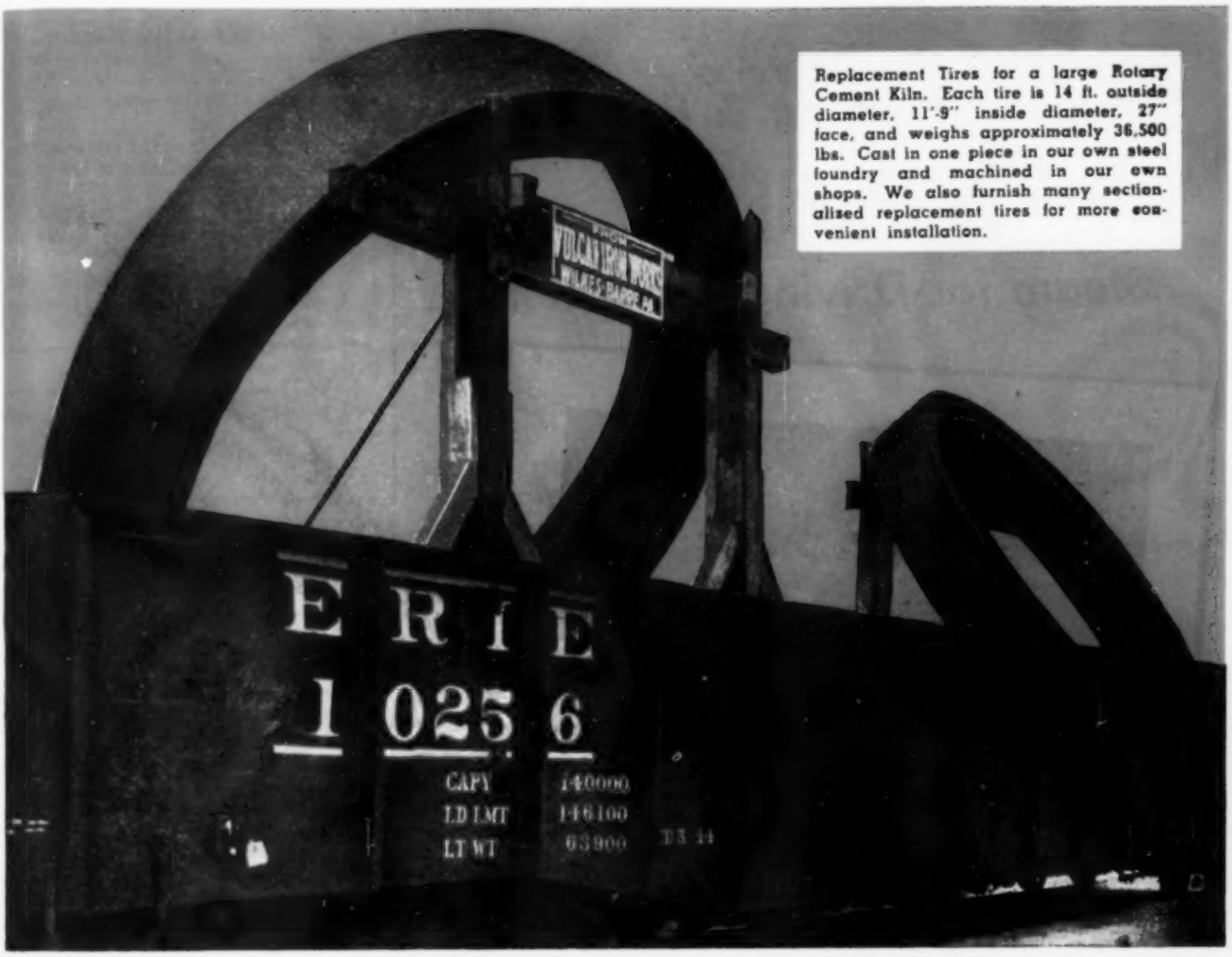
Several other blacks were indicated, but based on the small usage they were of no general importance. It should perhaps be mentioned that German blacks to a large extent were produced from materials other than natural gas, for example from acetylene and from naphthalene.

The only pigment other than black which found use in tire compounding was zinc oxide, appreciable quantities of which are shown in some carcass compounds.

Softeners and Plasticizers—A considerable number of softeners appear in the tire stock recipes. The German buna required more softener than does GR-S and usually several were used in a given compound. Availability may have had a bearing on the number of different materials that are shown.

In German practice master batches made of buna and softeners were often used to improve mixing efficiency.

The usual materials as pine tar, stearic acid, rosin, cumar and several waxes ap



Replacement Tires for a large Rotary Cement Kiln. Each tire is 14 ft. outside diameter, 11'-9" inside diameter, 27" face, and weighs approximately 36,500 lbs. Cast in one piece in our own steel foundry and machined in our own shops. We also furnish many sectionalized replacement tires for more convenient installation.

DEPENDABLE SERVICE

on Large Cast-Steel Replacement Parts

Repeat orders are the best evidence of satisfactory service and Vulcan has been furnishing large cast-steel replacement parts to many well-known organizations for nearly a quarter of a century. The two tires shown above are not only a repeat order, but also illustrate another important point—that our replacement-part service is not confined to equipment of our own original manufacture.

Write us regarding any requirement involving either carbon or alloy steel castings up to approximately 40,000 lbs. in unit weight. We provide any desired degree of engineering, pattern-making and machine-shop service; including the manufacture of complete special machinery according to the purchaser's designs and specifications. Estimates furnished promptly on request.

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Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Rotary Kilns, Coolers and Dryers	Toothed, Double-Roll Crushers	Heavy-Duty Electric Hoists	Steam Locomotives
Rotary Retorts, Calciners, Etc.	High-Speed Hammer-Type Pulverizers	Self-Contained Electric Hoists	Diesel and Gasoline Locomotives
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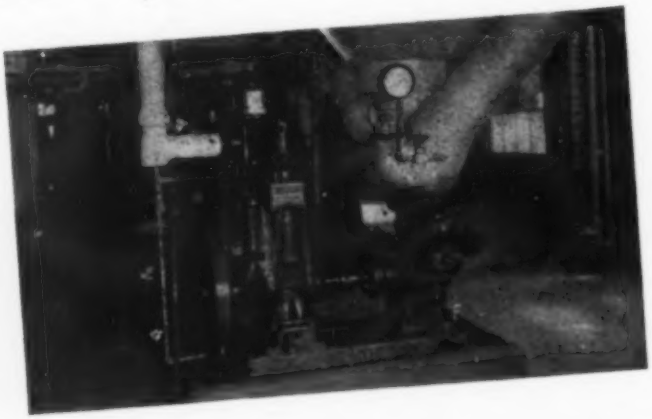
Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears	Electric Locomotives and Larrys

Steam for Heating & Processing

BUT FIRST

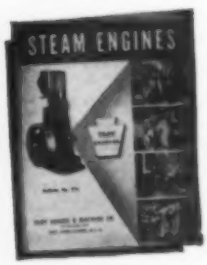
Steam for Driving Equipment



First, put the steam through a Troy-Engberg Steam Engine and send on the exhaust to help on the heating load. In this way you get nearly all the heat anyway and, on addition, By-Product Power at such a low-cost that the engine soon pays for itself.

Many processing plants have done this and have saved considerably in their power costs. For example, Troy-Engberg Engines paid off as follows:

1 . . . in 3 months in a distillery
2 . . . in 13 months in a ceramic plant
3 . . . in 7 months in a candy factory
4 . . . in 7 months in a dairy
5 . . . in 30 months in a tinplate mill
6 . . . in 23 months in an oil refinery



The power inherent in boiler steam should be extracted *first* before using that steam for heating or processing. Keep this in mind when figuring on a drive for that blower, fan, pump, compressor, cooker or other processing equipment.

TROY ENGINE & MACHINE CO.

Established 1870

1330 RAILROAD AVENUE **TROY, PENNSYLVANIA**

pear in German formulas. Naftolen was used in considerable quantity, probably because of availability and low cost. In addition the following appear most frequently in the recipes:

1. Kautschol—a brown, tarry substance obtained from the distillation of low grade coal or lignite.
2. Kakol—a 50-50 mixture of Kautschol and rosin, used as a Koresin substitute when the latter was not available.
3. Aktiplast—zinc salts of C-10 and C-11 synthetic fatty acids used to replace stearic acid.
4. Softeners WA-3 and WA-4—wool-grease substitutes.
5. W-77—dibutyl thiodiglycollate—used to improve low temperature properties.
6. Resinol—55 mineral oil and 45 rosin.
7. Plasticator RA—Residue from ethyl-benzene distillation.

Two materials were unlike any in general use in this country. They are:

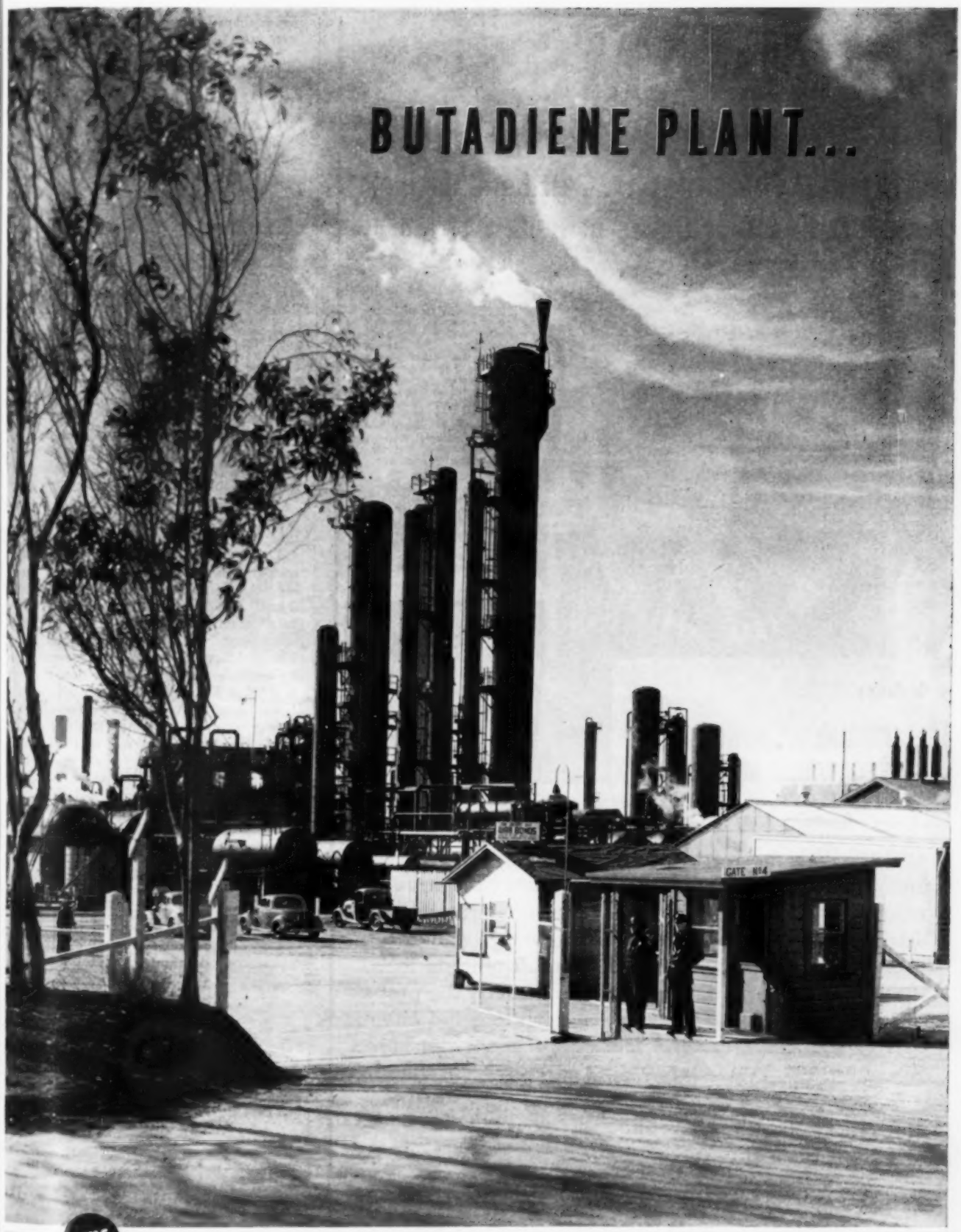
1. Plasticator 32—This is buna 32 which is a viscous low molecular weight sodium polymer of butadiene. It was used rather extensively in many compounds as an aid to processing. Extrusion and calendering characteristics were improved appreciably.
2. Koresin—a highly regarded tackifier which is a tertiary butyl phenol-acetylene condensation product.

Koresin in the German compounds deserves special mention since the simple study of their tire formulations does not reveal the desired amounts of or full reasons for the use of this material. Since the production of Koresin was insufficient to meet the demands of the industry, it was used sparingly or eliminated altogether in places not considered highly important. If greater supplies had been available, increased quantities would have gone into formulations and more compounds would probably have contained Koresin. It is claimed that the use of Koresin was not only to save natural rubber but to improve quality. Koresin in such places as tread cement and in the ply freshening solution was considered as particularly essential because German tire technologists believed it bad practice to use a natural rubber cement between buna plies or under the buna tread. It was the definite opinion that a better tire was produced with a Koresin wash than with crude rubber cement.

The only place where a crude rubber cement was permitted was at the tire machines in the ply turn-up around the bead where some of the tire constructions required a tackier adhesive than could be obtained with Koresin and buna.

Accelerators — Mercaptobenzothiazole, benzothiazyl disulphide, diphenylguanidine, and Vulcacit AZ, which is a condensation product of mercaptobenzothiazole and diethylamine, said to be similar to Santocure in its curing effects, accounted for practically all German accelerator requirements. Apparently no accelerators that may have been developed in Germany proved superior to any of the above list of standard materials.

Anti-Oxidants—Phenyl beta napthylamine was the most common anti-oxidant in use in compounds. This same chemical was apparently used in buna polymeriza-



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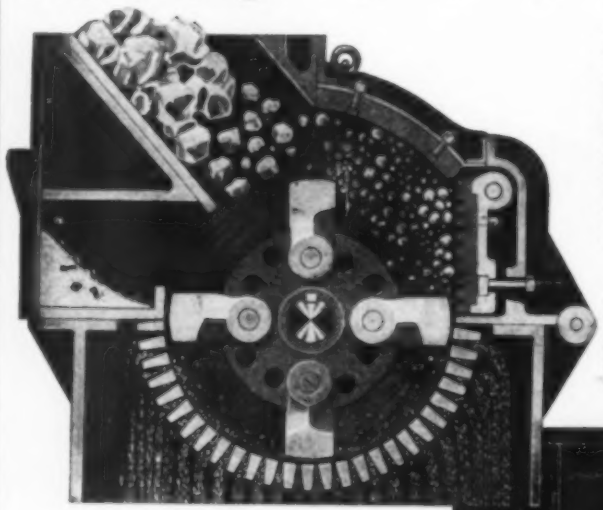
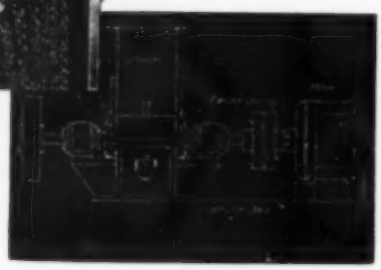


Sectional view of Williams over-running hammermill with heavy liners and grinding plate for limestone and other hard material. Particular attention is directed to the grinding plate adjustment which assures uniform close contact of hammers and grinding plate at all times. Also note the metal trap which provides an outlet for the escape of tramp iron.

Williams Hammer Grinder direct connected to motor, all mounted on heavy cast base. This type of drive is economical to operate and easy to install.



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tion perhaps in lesser quantities than have been used here.

Anti-oxidant 4010 appears in a few formulations. This may be a condensation product of cyclohexanone and amidodiphenylamine, and was said to be a paraphylene diamine derivative.

Desmodur R—In connecton with the dipping and doughing operation it may be of interest to touch briefly on a development that was in progress at the Phoenix Plant with a material called Desmodur R.

This chemical, an I. G. product, is said to be p,p,'p,"—isocyanto triphenyl methane or triisocyanate of triamino triphenyl methane. The claims for Desmodur R were threefold:

1. By using a Desmodur R stock to dip the rayon cord it should be possible to eliminate the doughing operation which is necessary when conventional dips are used. Tires manufactured by the Desmodur R method were said to perform as well on the road as regular tires.

2. After calendering Desmodur R treated cord fabric is much more flexible and, therefore, easier to handle in the tire building operations.

3. More satisfactory rubber-to-Perlon adhesions were obtainable by using Desmodur R than with regular dips.

Desmodur R solutions tend to gel and produce scorch in compounds. Also trouble was encountered in that dried out dough containing Desmodur R was very hard to remove from drying drums and other parts of the doughing machine. These difficulties were solved eventually by applying a second coat of dough from which the Desmodur R is omitted.

Supply of Carbon Black—According to figures supplied, German carbon black production reached its peak in 1943 when 57,694 tons were produced of which 41,781 tons were used in Germany and 12,348 tons outside Germany. In 1943, 120,000 tons of rubber were processed in Germany proper. Thus the usage of carbon black was of the order of 1 lb. of carbon for every 3 lb. of rubber. On this basis the requirement of carbon black to take care of existing rubber stocks in Germany (estimated to be 9,000 tons) would be 3,000 tons which was said to be the total amount of black remaining in Germany as of May 1, 1945.

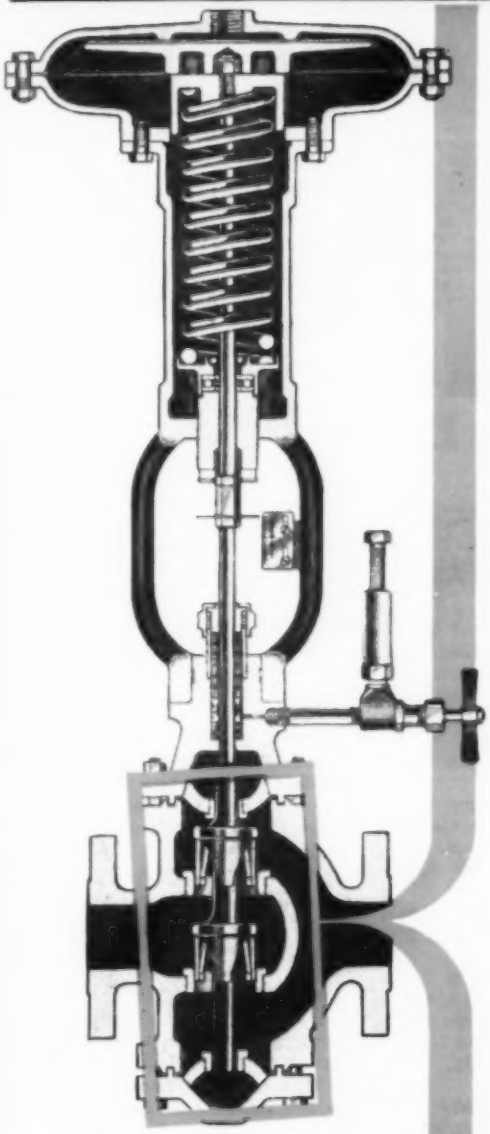
It was further estimated that there was sufficient carbon black capacity undamaged to permit the production of 23,000 tons of black per year. The requirement of black, should all available rubber processing plants resume operation, would be about 16,000 tons per year.

Conversion from Natural to Synthetic—The conversion of German industry to the use of approximately 100 percent synthetic rubber was not a serious problem until 1943. In each of 1940, 1941 and 1942, in excess of 20,000 tons of natural rubber were used. These figures represented 20-25 percent of the total rubber used in Germany. By the end of 1942, the natural rubber inventory was extremely low (an estimated 500 tons). The blockade had become so tight that relatively little rubber was getting through.

The result was that only 4,000 tons of natural rubber was reported to have been used in 1943 which was a little less than

TOP AND BOTTOM GUIDED

V-PORT INNER VALVE



Fisher diaphragm control valve equipped with direct acting characterized V-port inner valve top and bottom guided. Same construction available with reverse acting type inner valve.

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3 percent of the total. Thus, the big conversion from natural rubber to synthetic took place in 1943 even though the Government did not make the use of 100 percent synthetic mandatory until the middle of 1944. After making the use of synthetic mandatory, certain exceptions were made where natural rubber was proven to be necessary. In 1945, use of natural rubber increased due to shortage of synthetic.

In converting to synthetic, there was considerable opposition from the industry. It was stated that tire production capacity dropped at least 30 percent when high percentages of synthetic were used. At the present time it was felt that most manufacturers would not use more than 50 percent synthetic in tires and tubes through choice and that some would go back to 100 percent natural rubber if possible. I. G. Farben was actively combating this trend by publicizing results of tests showing synthetic products to be superior to those of natural rubber.

FIBER RESEARCH IN GERMANY

THE REASON for the extraordinary growth of rayon staple in Germany is that the German Government encouraged the building of plants. There was a time in the early thirties where the production of staple rayon was considerably bigger than the consumption so the Government in Germany issued an order that all cotton and wool fabrics produced must contain not less than 15 percent of staple rayon which percentage was increased further later on.

On the whole, the idea of blending rayon staple and cotton was not considered successful, at least not in all fabrics, therefore, a large program of research was instigated to put all efforts on 100 percent rayon staple fabrics wherever possible and feasible. This research included new types of fibers, constructions and finishes. Research in Germany is mostly done by textile schools. Most of these have, besides their regular school, also exceedingly well equipped laboratories, which are not run by students, but by a regular laboratory staff under the direction of the professors. Here all types of research are being produced, but always pertaining to their particular field. For instance, the Textil Fach Schule in Reutlingen specializes in cotton type machinery and finishing and would put their efforts of research on rayon, cotton, flax, hemp, fibers and processing. The name of their research branch is Deutsches Forschungs Institute.

Large research programs also were in progress at the I.G. Farben on dyestuffs textile chemicals and finishing compounds. The budget on research at their various plants runs something like 100 million R.M. annually. Another type of research also was found necessary which might be called "Industrial Research." The Reichsstelle did not always find it easy to apply the findings and results of various research programs to the industry. First of all, the research program of the various institutes was done on too small a scale and often on not too practical a basis, and when it came to the point of using the findings and recommendations, there was too much controversy among the various manufacturers

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(Melting point . . . 280° F.)

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1. ACRAWAX C has an extremely high melting point (280°F.) and when incorporated with other materials raises the melting point of the blends to a marked degree. Added resistance to cold flow is also imparted.
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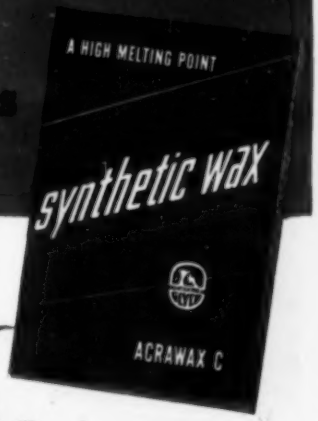
7. ACRAWAX C is compatible through hot melt procedure with a wide range of materials, many of which serve to modify it to give additional valuable characteristics such as greater adhesion, more flexible film, etc., as desired.
8. ACRAWAX C imparts amorphous characteristics to many of its blends, thus removing undesirable crystalline effects.



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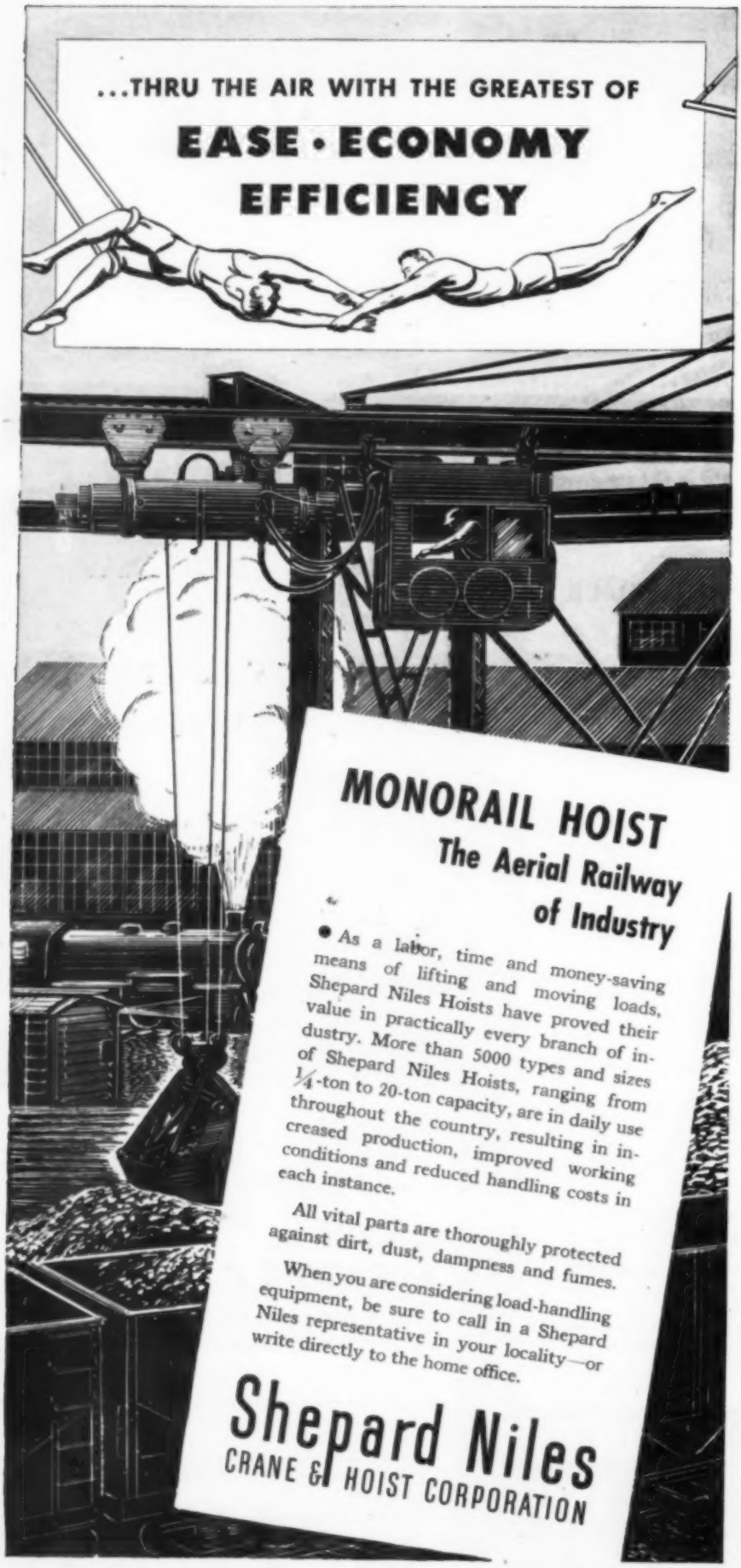
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as to the practicability of the recommendations made. They stated the research was too academic. Since the rayon staple was the biggest raw material source it was decided to build a pilot plant for the spinning of rayon staple and to show the industry how to get the optimum results on these fibers.

TEXTILE FINISHING IN GERMANY

RESEARCH and development work by I. G. had produced the Persistol brands of water repellents. The first of these brands were a continuation of the Ranasit ones in that they were wax emulsions. However, instead of employing aluminum salts they were used in conjunction with zirconium oxychloride. Results were obtained which were very good. Repellency was increased and permanency to washing greatly improved.

Further research developed that ethylamine chains were of particular interest as water repellent and crease resistant or shrinkage control compounds. Several water repellents of this type were put on the market and used.

Extensive research work was carried on in the field of non-swelling agents. These included the use of formaldehyde alone, the urea and melamine formaldehyde resins and a late development from the same base as the latest water repellents. This last resin, worked out as far as pilot plant production, could be cured at a temperature around 175 deg. F. It was compatible with the water repellent product and therefore it was possible to produce a water repellent and crease-resistant finish in one operation.

The latest resin development is of great interest because of its low curing temperature. It would be wise, however to consider it purely as an interesting experiment until such time as manufacturing procedures and performance qualities have been evaluated.

A great deal of research work was conducted on such products as detergents, emulsifiers, water softeners and other products in the auxiliary field. The scarcity of natural fats and oils gave an impetus to the work in the detergent and emulsion fields. A detergent suitable for use as a body soap or hair shampoo was developed and approved by German doctors for use on the most delicate skins and as a cleanser in cases involving burns. A boring oil, also used as a grinding and cutting oil, was developed and produced in considerable tonnage. This particular product has the ability to prevent the formation of rust and is economical to use.

The wearing quality of fabrics was of the utmost importance to the German economic picture during the war. The failure of cellulose fabrics to withstand repeated washings was the subject of a thorough investigation. This study was conducted over a period of two years and some 30,000 tests and experiments were carried out. The results of these experiments proved that the deterioration of fabrics, especially rayons in laundering was due to a solubilizing of the cellulose by free oxygen in the pressure of metal salts in the water.

Visits to many finishing plants revealed

Jenkins PRACTICAL PIPING LAYOUTS 5

How to plan HOT WATER SUPPLY HEATING TANK CONNECTIONS

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2	Same as A	Circulating Water Shut Offs
2	Same as A	Hot Water Supply Shut Offs
2	Same as A	Modulating Valve By Pass Shut Offs
2	Same as A	Steam Supply Control Valve By Pass Shut Offs
4	Same as A	Trap Shut Offs
4	Same as A	Trap Shut Offs
2	Fig. 106 A Br. Globe	Cold Water Feed to Tank
2	Fig. 106 A Br. Globe	Cold Water Feed to Modulating Valve
2	Fig. 106 A Br. Globe	Circulating Water Return Feed to Tank
2	Fig. 106 A Br. Globe	Hand Control By Pass for Modulating Valve
4	Fig. 106 A Br. Globe	Combined Feed to Tank
2	Fig. 106 A Br. Globe	Water Drain
4	Fig. 106 A Br. Globe	Hand Control By Pass for Steam Admission Valve
2	Fig. 106 A Br. Globe	Trap Test on Steam Return
2	Fig. 106 A Br. Globe	Bleed on Steam Boiler
2	Fig. 106 A Br. Globe	Bleed on Steam Boiler
2	Fig. 117 A Br. Check	Cold Water Feed Check
2	Fig. 117 A Br. Check	Cold Water Feed Check
2	Fig. 117 A Br. Check	Cold Water Feed to Modulating Valve Check
2	Fig. 117 A Br. Check	Hot Water Feed to Modulating Valve Check
2	Fig. 117 A Br. Check	Steam Return Check

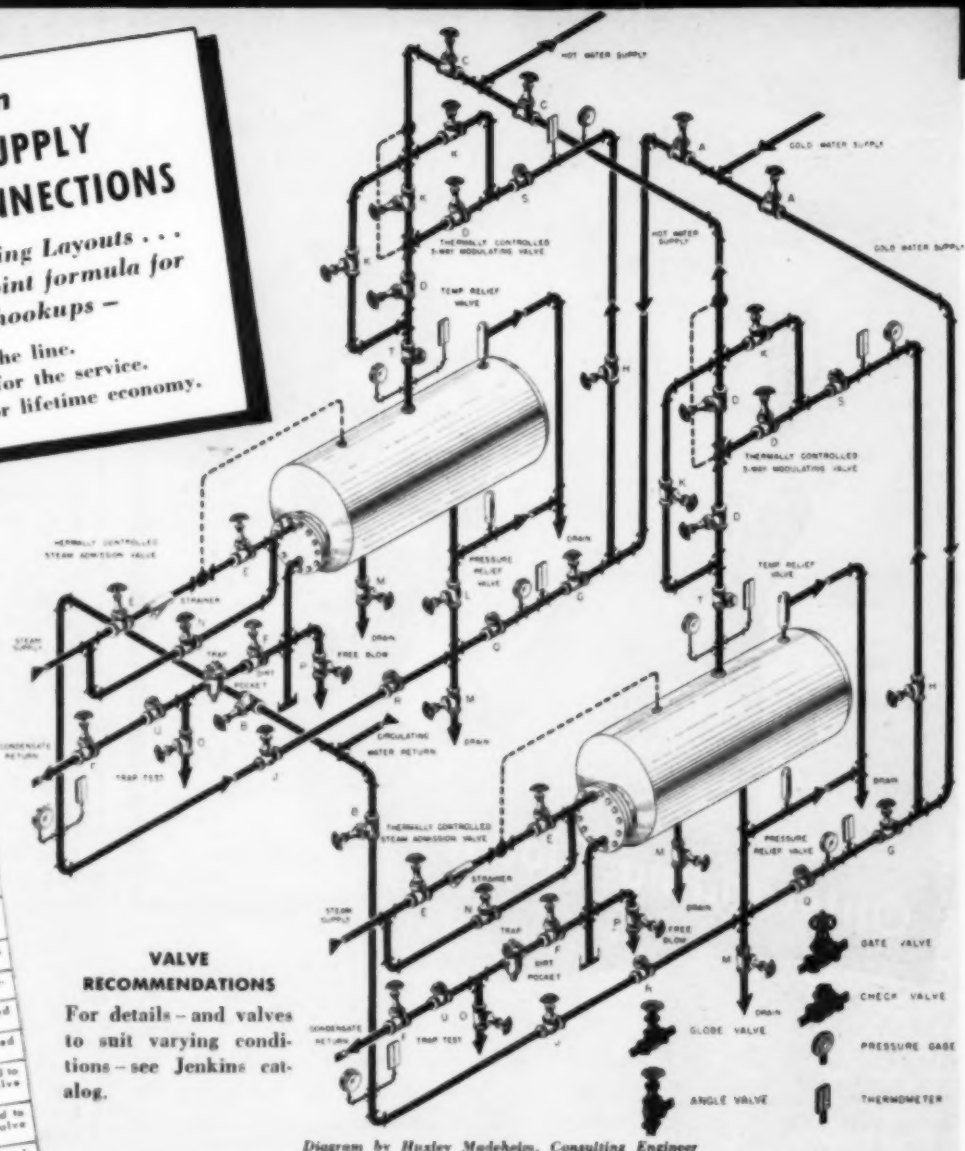

Diagram by Huxley Madeheim, Consulting Engineer

VALVE RECOMMENDATIONS

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CONSULTATION with accredited piping engineers and contractors is recommended when adapting these suggestions to your own requirements, or when planning any major piping installations.

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one radically different step in the boil-off or scouring of rayons. Practically every yard was given a chlorine bleach. This included spuns, filament crepes and even Bemberg sheers.

A typical set-up observed in one mill and used for crepes and sheers consisted of full-width impregnation tank in which the cloth was given caustic followed by a rope wash; chlorine bleach, anti-chlor, three soapings and a hot and cold water rinsing. The active chlorine content was held to 0.5 percent.

Among other items of interest, was a new line of dyes. These were called "Astrasons" and were developed primarily for printing on acetate. They have a brillance equal to the bright basis colors and are fast to washing and have good-to-excellent fastness to light. Mills that have used them preferred them to the acetate colors.

PHARMACEUTICAL ACTIVITIES OF I. G. FARBENINDUSTRIE

PHARMACEUTICAL activities of the I. G. are not carried out at one plant but are divided between three plants. All the products, however, are sold under the Bayer trademark. Research and manufacturing are carried out at the plants at Elberfeld and Höchst, while certain intermediates and the fabricating and packaging of Elberfeld products is done at Leverkusen. The entire pharmaceutical field is divided along arbitrary lines between the Elberfeld and Höchst plants.

The Elberfeld plant employs about 1,000 men and makes some dyestuffs along with the drug processing. This plant was formerly the Friedrich Bayer Farben Fabrik. Höchst employs about 12,000 men, of whom only about 1,400 are engaged in the manufacturing of pharmaceuticals. This plant was formerly Meister, Lucius and Bruning. It makes many dyestuffs, heavy chemicals, etc.

War damage to the plants at Elberfeld and Höchst was practically nil, but the Leverkusen plant suffered more damage, estimated at perhaps 30 percent.

The vitamin production as well as vitamin research of the I.G. is divided between the two plants. Except in the case of vitamins K and P, only the accepted natural vitamin is prepared either from natural sources or synthetically.

Research work on other vitamins such as B_6, pantothenic acid, folic acid, etc., is at present not being carried out actively. Methods for the preparation of B_6 and pantothenic acid are well worked out, but these two products are not yet on the German market. Information with respect to folic acid is scanty.

Vitamins B_1, B_2 and C are made according to the usual methods, C being made with glucose as the starting material. Vitamins D_2 and D_3 are made by irradiation, the final purification being effected via the dinitrobenzoate in the case of D_2 and via the methyl dinitrobenzoate in the case of D_3.

Vitamin E is supplied to the market in the form of wheat germ oil, prepared by methyl alcoholic extraction of the germ. A high concentrate containing about 25-30 percent of vitamin E for injection has been developed experimentally, but is not yet

SERVICE REPORT

THE PARKER APPLIANCE COMPANY

This is the present status of the case in which a Parker Triple Fitting replaced a wrought iron elbow, which was brazed to the static pressure lead in a gas meter.

Under pressure surges -- from 5 pounds to 4,000 pounds -- the wrought elbows frequently exploded, destroying the meter dial and spraying out broken metal and shattered glass.

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1. Reduced installation time.
2. Safe handling of all pressures involved.
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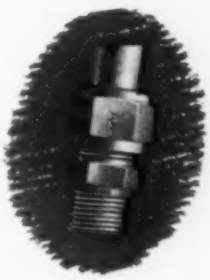
Company then made same replacement on equipment in service -- all trouble eliminated.

Association promoting industrial gas meters reported that Parker triple type fitting has proper flare angle to withstand high pressures, and provided tight connection without injury to tubing.



The patented Parker Triple Coupling—easy to install and service—proof against leakage and vibration.

The principle of this coupling is the basis for modern Fluid Power Systems.

The record of Parker couplings, valves and fabricated tubing is one of complete dependability in both war and peace.

Whatever you make, or plan to make, consult a Parker Fluid Power engineer on tubing systems for either fluid or power transmission. The Parker Appliance Company, 17325 Euclid Ave., Cleveland 12, Ohio.

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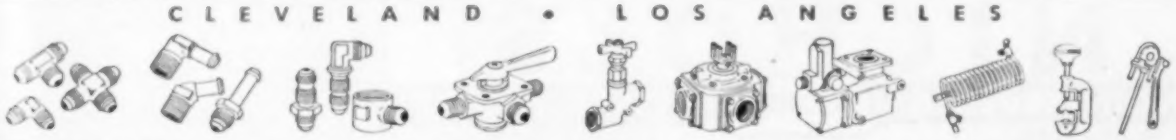

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NICHOLS offers a complete Engineering Service as consulting and designing engineers and construction managers, for the building of new, or the modernization of existing plants for roasting, calcining and drying of ores and concentrates.

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During these fifty-six years, Nichols Herreshoff Multiple Hearth Furnaces have thermal processed scores of materials, making possible lower manufacturing costs, higher quality products and new avenues of profit through the reclamation of waste materials.

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on the market. This product is prepared by removal of the steroid fractions by freezing out and the fatty acid portion by ester interchange to the corresponding methyl esters followed by high vacuum distillation. The vitamin E remains behind following the distillation.

In the vitamin K field two products are made, one for oral use and the other for injection. These two products are Hemodal T and Hemodal L.

Vitamin P (Citrin) is being sold. Research is in progress for the purpose of making the hesperidin portion more water soluble. Various sodium salts of polybasic acid esters have been made to accomplish this end. The best seem to be sodium-hesperidin succinate and sodium hesperidin butane 1-,2-,3-,4-tetracarboxylate.

Only two mixtures of vitamins are made. The feeling at I.G. was that mixtures of A and B_1 and/or B_2 were unstable. Mixtures of B_2 and nicotinamide are now on stability trial. Mixtures of B_1 and nicotinamide have not been made.

Work had been done at both the Elberfeld and Höchst plants of the I.G. on the production of penicillin. At Elberfeld only very slight success was attained and only very small amounts of substance were produced. At Höchst, enough material was made so that the penicillin could be used clinically. Here also, the yields of penicillin in the broth were very small and processing losses high. Very little, if any, work was done on submerged fermentation.

All local anesthetics are made at Höchst. No new local anesthetics have been produced for the market for quite a few years. Research has, however, been carried out recently on a new series of esters designed to reduce the ease of hydrolysis when these are used for dental anesthesia and also designed to reduce interference with the sulfonamides when local anesthetics are administered in combination with them.

Research at Höchst on compounds having a morphine-like action has resulted in the development of two new series of active compounds. One example was known in America before the war and is at present on the American market. This is Demerol (called Dolantin in Germany.)

Barbiturates and hypnotics are made at Elberfeld, but no research is being carried out at present. During the last ten years several hundred examples have been made in the barbiturate series including several dozen thiobarbituric acid derivatives, but no thiobarbiturate was found which was considered good enough to replace or compete with Evipan.

All insulin manufacturing is carried out at Höchst. In normal times this plant makes about 50 percent of all the German insulin. Collection of glands in Germany is very difficult and the quality of these is very low. This is due to the fact that there are no large slaughter houses and all glands are collected from small establishments and public abattoirs. Consequently, an average yield of 1,000-1,500 units per kg. of glands is obtained. Three types of insulin are made.

A great amount of research has been done at Höchst in search of a substance active against arsenic-fast strains of Try-

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Bulletin 910 describes such advantages as two-stage separation (minimizing filter surface wear). Address: Pangborn Corporation, Hagerstown, Md.

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panosomes. The best compound found to date is designated as No. 9736.

Progesterone is made at Höchst from stigmasterol obtained from soya phytosterol. The method used follows the published one to obtain acetoxy-bisnorcholenic acid. To obtain progesterone from this acid, a new method involving the Curtius reaction was developed. A natural extract was made formerly but no natural hormone is now made.

Two organometallic products have been developed and are being marketed by I. G. Höchst plant for use in tuberculosis. One of them, a gold compound called Lopion has been in use for a number of years. The other, a copper compound, called Ebesal, was first sold in 1941. Both of these substances are claimed to be effective, but such types of compounds have not met with much success in the American medical practice.

Höchst has developed an antispasmotic which is used together with two synthetic sympathomimetic drugs for the relief of asthma. The solution is made for inhalation.

While research on new antipyretics has been conducted at Höchst for many years, no significant improvements have been made on antipyrene and pyramidone. A new member of the pyrazolone series has been made, but cost and difficulties of manufacture make its commercial usefulness doubtful.

All research and manufacturing of sulfa drugs is done at Elberfeld. Many hundreds of these have been made. Research is still continuing. All of the sulfa drugs used in the United States are also made in the I.G. plant. In addition, several new drugs in this field are also made. During the war in Poland, Rikuth of the I.G. found that sulfa drugs were quite active in Trachoma. Sulfapyridine and a drug B 1034 were used by the German Army.

A large amount of research has been carried out at Höchst on derivatives of quinolines and acridines. The object of this research was the development of arsenic-free agents for syphilis and other diseases such as trypanosomiasis. Selected compounds in this series which have been found active against various organisms.

No new sympathomimetic agents of interest have been found for years. A number of amines are being marketed and it is felt by the I. G. that these are adequate.

The production of sufficient blood plasma for the use of the German Army was not possible, due to the low nutritional state of the German population. Consequently, Professor Weese at Elberfeld was asked by the Wehrmacht to investigate the possibilities of synthetic substances. A polymerized product from the Ludwigshafen plant was found to be satisfactory, and it could be made in large quantities. This substance, was called Kollidon. The aqueous solution of 2.5 percent Kollidon together with various inorganic salts is called Periston.

Several new antimony compounds have been made at Elberfeld which are active against *Schistosomum mansoni*. These are emetics, so that parenteral administration is necessary. Other antimonials are also made, such as solustibosan, neo-stibosan, fuadin, etc. A new antimony-ar-

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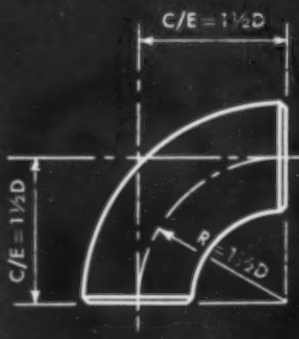
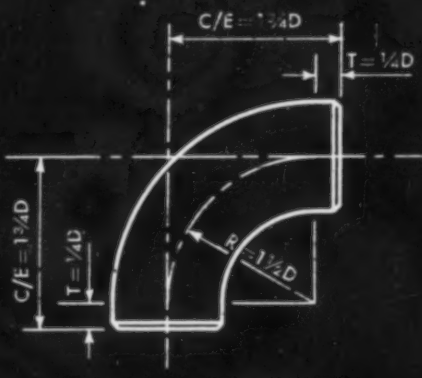


SIZES: 3/4" TO 12", INCLUSIVE

All dimensions conform to the American Standard for Steel Butt-Welding Fittings ASA B16.9. Unless order specifies otherwise, these "ASA Elbows" will be furnished.

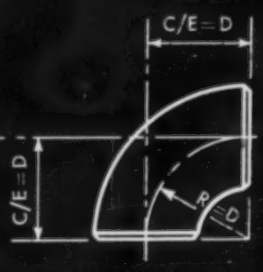
2 LONG RADIUS LONG TANGENT



SIZES: 2" TO 20", INCLUSIVE

Same radius as "ASA Elbows" but with long integral tangent on each end—an exclusive Midwest feature that saves time and pipe, and sometimes eliminates an extra weld.

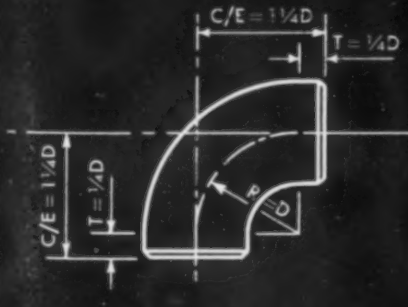
3 SHORT RADIUS



SIZES: 1" TO 12", INCLUSIVE

Where space limitations prevent the use of "ASA Elbows" or Midwest "Long Tangent" Elbows shown at left, these short turn elbows without tangents are recommended.

4 SHORT RADIUS LONG TANGENT



SIZES: 14" TO 24", INCLUSIVE

These OD sizes are short radius but have the exclusive Midwest long tangents that save pipe and make it possible to line up the fitting and pipe more quickly and accurately.

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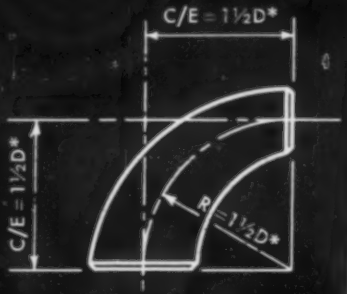

SIZES: 2" TO 12"*, INCLUSIVE

Only Midwest makes the reducing welding elbow which takes the place of a straight elbow and a reducer. It eliminates one weld, cuts installation cost, and reduces pressure drop.

SYMBOLS:

C/E = Center-to-End Dimension
D = Normal Pipe Size
R = Radius
T = Length of Tangent
*D = Dimension is Larger Pipe Size

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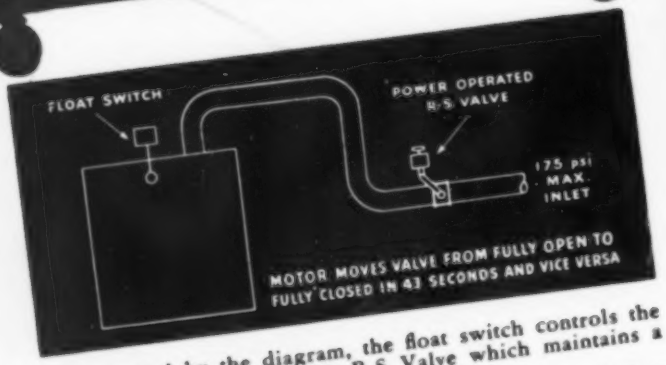
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R-S Valves are used advantageously to reduce, regulate and shut off pressure whether above or below atmosphere; to control liquid level; to relieve and control back pressure; to maintain a constant differential pressure; to control rate of flow; to control combustion and govern the output of pumps, fans, engines and turbines.

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senic preparation has also been made for use in Bartonellosis.

Kikuth at Elberfeld has done all of the research on compounds in the various tropical diseases. No active compounds have been found in Filariasis. In Schistosomiasis, several of the antimonials show considerable promise. A metal-free compound called Miracil is also promising in this disease. This substance has a low toxicity and a high effectiveness in various Shistosomi infections. In trypanosome infections, Kikuth feels that Bayer 205 is the best drug now on the market, with Fuadin second choice. It is possible that a member of the quinoline series being investigated at Höchst will be a useful compound for trypanosomiasis.

Much research has been done in the past on the antimalarial problem at Elberfeld. It is still continuing along the following lines: (a) Attempts to find an active prophylactic agent. (b) attempts to find a colorless compound of low toxicity with atebrin activity.

CONTINUOUS AND STAPLE FIBERS AND RELATED PRODUCTS

THE CIOS mission to investigate the rayon, staple, and other synthetic fiber plants of Germany, was made up of one representative from each of five different British and American rayon companies. Of the plants visited, eight made rayon only, four made rayon and staple fiber, and seven made staple fiber only, five made rayon raw materials such as cellulose acetate or wood pulp, and two were equipment manufacturers.

Cellulose Acetate—While the Nazis did not demand enormous increases in cellulose acetate production and the war brought no conversions comparable to those made by the viscose process section of the industry the effect of the war was felt by all cellulose acetate producers in the non-availability of cotton linters, their preferred primary raw material, which gave them yarns having 10 percent higher tenacity and cost less than German pulps. All were agreed upon the need for high quality cellulose and all used pulp containing 96 percent or more of alpha cellulose, the creped pulp made at Wolfen by the nitric acid process being their first choice.

Four cellulose acetate flake plants were visited and all showed very considerable differences in process as a consequence of differences in the proportion or kind of catalyst employed: thus whereas I.G. used only 1 part sulphuric acid per 100 parts cellulose at Dormagen, the Wacker concern at Burghausen went to the other extreme with 100 parts zinc chloride per 100 parts cellulose.

A diversity of opinion was noted on the need for cellulose pre-treatment before acetylation, but the two factories that show the best technical control (I.G. at Dormagen and Lonza at Waldshut) pre treat the shredded pulp and attempt to improve uniformity by prolonged agitation, coupled, in one instance, with an elevated temperature. Acetylating methods differ greatly. Acetylating equipment varied at the four plants from ordinary pfleiderers through xanthater-mixers and long horizontal mixers to drums of large

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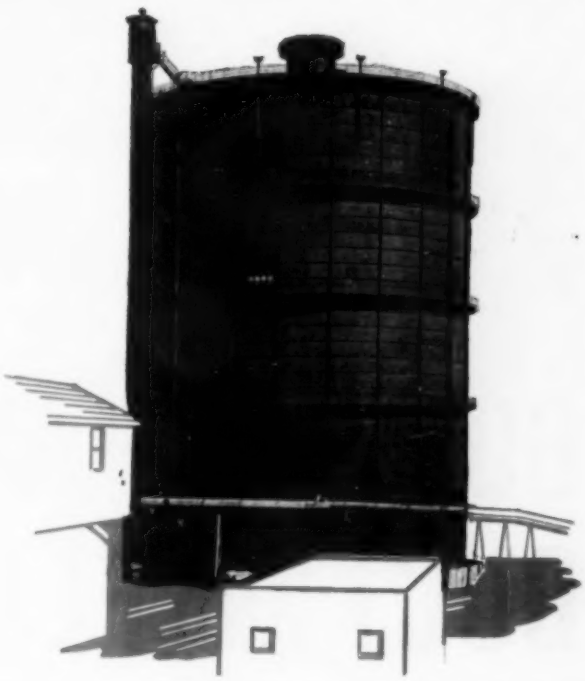

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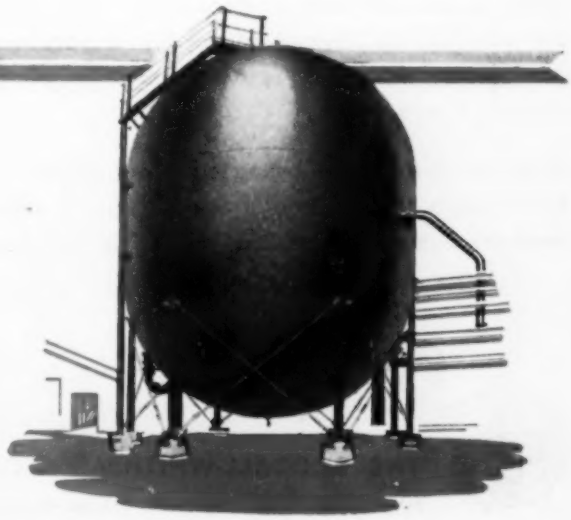

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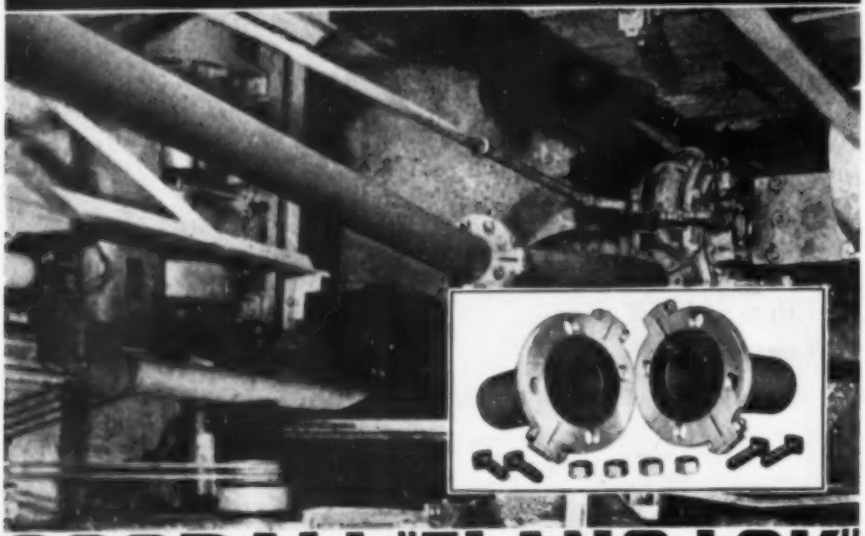

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FEATURES

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diameter. In only one case was there an approach to the mass-production scale of German viscose manufacture. This was at I.G.'s Dormagen plant where 5,000 kg. charges of cellulose acetate are made—in comparison with the 150 kg. charges of the Lonza works at Waldshut.

One feature of German practice is acetylation at temperatures around 50-60 deg. Only one of the four plants operated in the range of 25-35 deg. At the higher temperatures, excessive refrigeration service was unnecessary, acetylating cycles were shorter, averaging around six hours and over-all plant capacities were increased. Further, by ripening at 55-60 deg. C., sometimes with agitation, 6 to 8 hr. cycles were realized at Dormagen and compared very favorably with the 60 hr. cycles at 25 deg. C. of the Waldshut plant. No factory practiced stabilization as normally understood. However, all claimed that their products satisfactorily withstood heat tests.

The ratios of acetic anhydride to cellulose for the four processes are of the same order, that is 2.5 to 3, but in acetic acid ratios there are wide differences. Dormagen uses methylene chloride as solvent instead of acetic acid and consequently can operate with much smaller waste acid extraction and recovery systems than are usual. The recovery systems of three of the plants make orthodox use of ethyl acetate as the extracting liquid. The Rhodiaceta factory at Freiburg favors diethyl ether.

An important unit in Dormagen's mechanization is their continuous counter-current washing machine. A two-foot layer of flake is conducted through the 40 meter machine on a perforated, stainless steel conveyor belt in about 24 hr. The machine is divided into 13 zones with a drip tray located above and a sump below each zone. The sumps have pumps which pass one-third of the liquor to the drip tray ahead and recirculate two-thirds of it. The first sump yields an 18 percent acid for recovery treatment.

Only one system for the manufacture of acetate staple was seen. This was at the Wacker Plant. It provided an interesting example of high-speed spinning at 360 to 420 m. per min. combined directly with cutting. The threads from a number of jets are carried down a funnel by a large volume of water which keeps the bundle taut enough to permit cutting by knives carried radially on a rotary shaft. To effect crimping, the staple is boiled in soap solution, centrifuged, and dried, a tallow emulsion being applied during centrifuging.

Cellulose acetate mixing calls for no other comment than that the volume of charges was universally small. Filtration is also orthodox, two of the spinning plants filtering at the relatively elevated temperatures of 40-50 deg., while Lonzona operated filtration at room temperature. The latter plant had ingenious motor-driven unit pumps directly attached to the base of each storage tank for the transfer of dope. These are known as "Dickstoff" pumps and are made by Gerberich.

One fair example of each of two types of acetone recovery was noted. Lonzona

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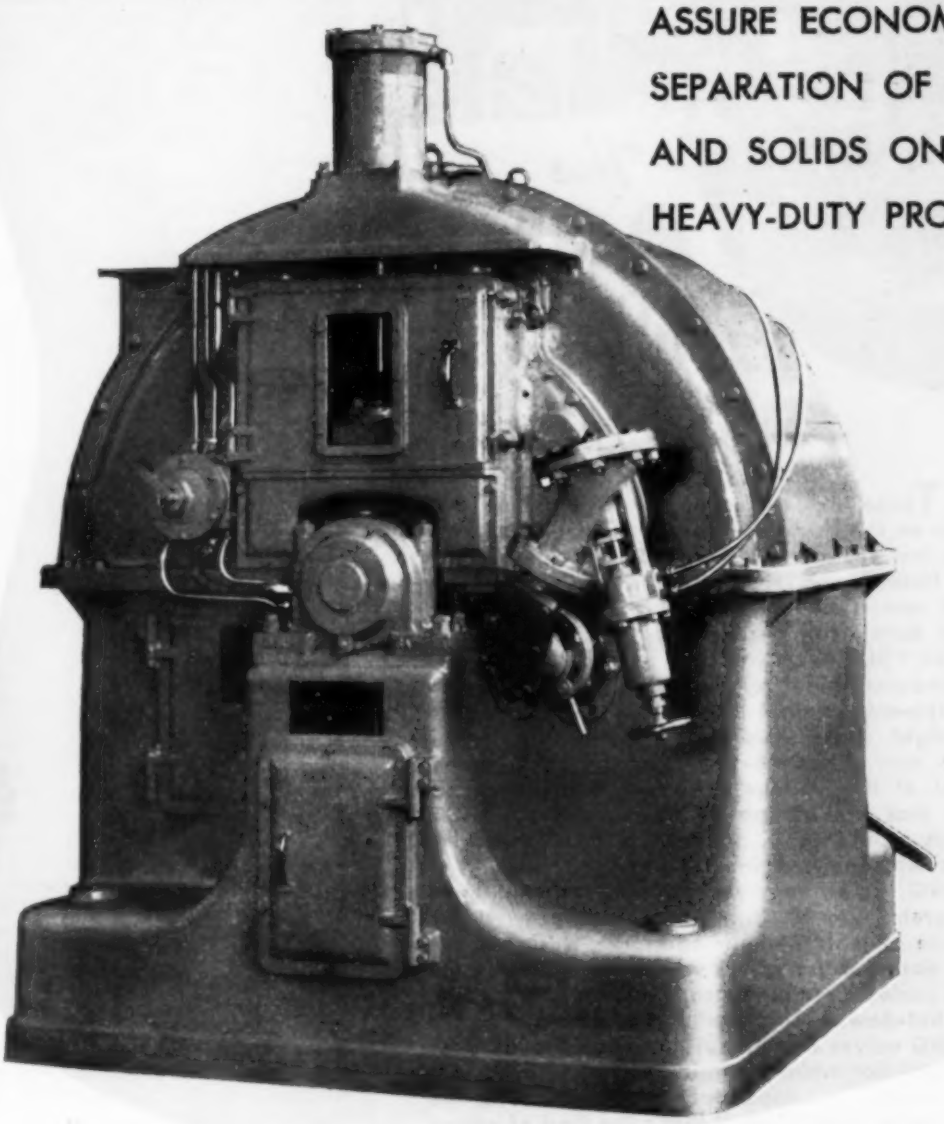

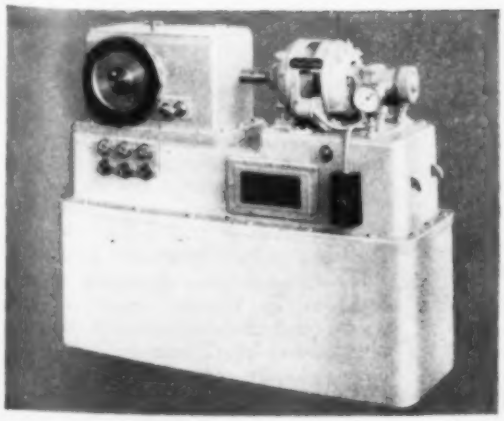

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Because of their 24-hour operation, this chemical plant does not use valves which would require the usual periodic maintenance, necessitating production shut-downs. That's why you see these EVERLASTING valves throughout the plant! Trouble-free . . . many not maintenanced in years of this gruelling service . . . dependably serving a long life sentence at hard labor! If *that's* the kind of valves you need—*then always specify EVERLASTING Valves!*

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recovered by adsorption on charcoal and Rhodiceta by scrubbing with water. Both companies claimed actual recovery efficiencies of 99.1 percent and over-all solvent efficiencies of 92.3 percent.

Cuprammonium process—Two cuprammonium process plants were available for inspection, the I.G. plant at Dormagen and the Bemberg plant at Wuppertal. The former plant had a daily production of 13 tons of yarn, 33 tons of staple, and 5 tons of artificial horsehair; the latter, 35 tons of yarn and 3 tons of cuprammonium film.

Both companies preferred linters as a source of cellulose but, of course, were obliged to use wood pulp. The type Dormagen considered best was the nitric acid processed pulp made by I.G. at Wolfen and delivered to them in specially lined box-cars as 50 percent wet flake. This they had been able to use directly in mixing. When it became more difficult to obtain Wolfen pulp from Central Germany, they adopted Waldhof pulp of 88 percent alpha cellulose content and purified it.

The pulp was shredded and mixed continuously to a 1.5 percent slurry in 10 percent caustic soda and then washed and dewatered on vacuum filters. It was claimed that by this process, pulp of 95-96 percent alpha cellulose content was obtained free from the 4-5 percent of pentosans that are considered detrimental to spinning and to the wet tenacity of yarn. The caustic consumption was approximately 50 kg. per 100 kg. of purified cellulose.

Also continuous up to the dissolving step at both plants, was the precipitation of basic copper salts. At Dormagen, copper sulphate solution from the recovery plant is fortified by the necessary additions of new salt to a content of 12 g. of copper per liter. It is continuously precipitated at 90-95 deg. C. with a 20 per cent hot sodium carbonate solution in four wooden vessels at descending levels. Thickening and vacuum filtering follow to produce a cake of approximately 30 per cent basic copper sulphate which is used in mixing without removal of byproduct salts. The mother-liquor is continuously returned with the blue water from spinning to the recovery plant.

Normally anhydrous synthetic ammonia was purchased in tank cars and a 25 per cent solution made by releasing the gaseous ammonia through a simple water ejector, the heat of reaction being absorbed in a heat exchanger. The soft water used for cooling was then routed directly to the spinning funnels. Toward the end of the war, when the supply of synthetic ammonia ceased and lack of transportation prevented the use of coal gas ammonia, Dormagen was reduced to the production of ammonia in the plant from ammonium sulphate and lime.

The initial cellulose dispersion is made in 13 hr. in 12-cu.m. vessels, a slight excess of caustic being added to complete solution and check corrosion. Any required viscosity reduction is effected by continued stirring and sodium sulphite is used to control the extent of the reduction. Temperature is not allowed to exceed 24 deg. C. In 22-cu.m. mixers the dope is diluted to spinning concentra-

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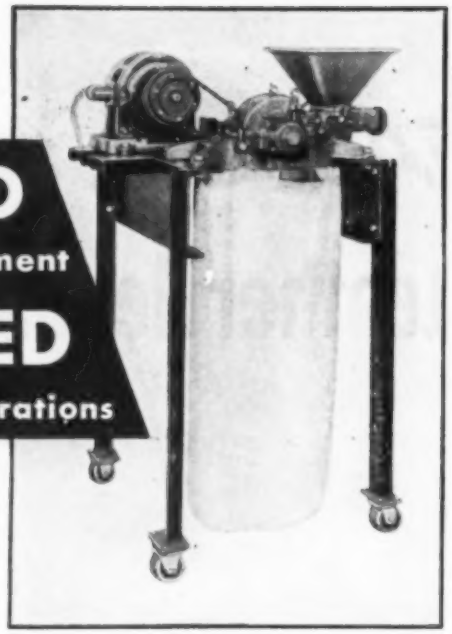

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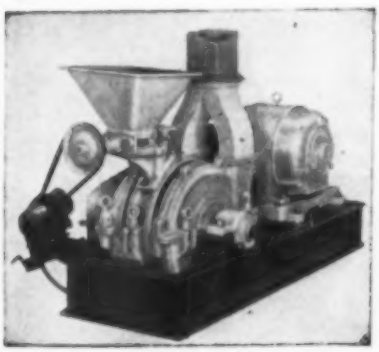

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MIKRO-PULVERIZER (FINE)
MIKRO-ATOMIZER (ULTRA FINE)
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tion of 9 percent cellulose, 3.6 percent copper and 7 percent ammonia. Transfer to 40-cu.m. blenders, nickel gage, filtration and deaeration follow.

Dormagen's normal spinning machines consist of two halves which may be operated separately and have 192 spinning heads per half. The spinning solution to each half is fed by a single gear pump through a polyvinyl chloride header pipe to 96 twin funnel spinning units. Each funnel produces two threads at a speed of 30 m. per min. The spinning solution is extruded downward through a glass cone concurrently with deaerated warm water, then passes under a stainless steel rod, around a 4-in. take-up roller of frosted glass over which 7.5 percent sulphuric acid is trickled. The thread is collected on a collapsible reef over which additional acid falls.

Both I. G. and Bemberg were developing continuous spinning and after-treating machines. I.G.'s continuous spinning machine comprises a three-tier unit of 68 funnels per tier. The 204 threads are drawn as a warp into a common acidifying batch and then into a continuous-treatment machine equipped with upper and lower Ebonite rollers, 6 ft. long and 5 in. in diameter. From the treatment and finishing baths, the warp passes through a dryer after which the threads are separated and wound on 1½ lb. cheeses or the warp may be beamed.

At Wuppertal, the arrangement was similar but there were six continuous machines having 400 positions each and capable of producing a total of 3,600 kg. per day. Bemberg claimed that the continuous machines would save two-thirds of the usual labor cost and that they expected their costs to be lower than viscose process costs.

The spinning of cuprammonium staple fiber is similar in principle to the rayon spinning but proportionately larger funnels are used. There are eight Cuprama machines with jets having 750-3,000 holes of 0.8 mm. diameter. These are capable of producing a filament denier range between 0.75 and 3.75 at speeds of 60 to 90 m. per min.

The dope-dyed Cuprama was made by injecting a cheap phthalocyanine color into the solution just prior to spinning. Mixing of the color with the dope is aided by a screw mixer, 8 ft. long and 4 in. in diameter, inserted in the feed line just beyond the point of color injection.

The cuprammonium monofil material known as "Crinex" is spun on a modified Cuprama machine from a jet about 3 in. in diameter containing 100 holes. These filaments are of approximately 360 denier. The jets are suspended over a bath containing 20-25 percent caustic soda solution at room temperature, there being an air gap of 1 to 4 in. between the jet face and the coagulating bath. The filaments fall vertically to a reverse bar in the caustic bath from which they are taken to the opposite side of the machine and collected into a tow. For after-treatment the tow is drawn through four horizontal troughs about 40 ft. long arranged one above the other. The first and lowest trough contains sulphuric acid solution to neutralize the soda and dissolve the

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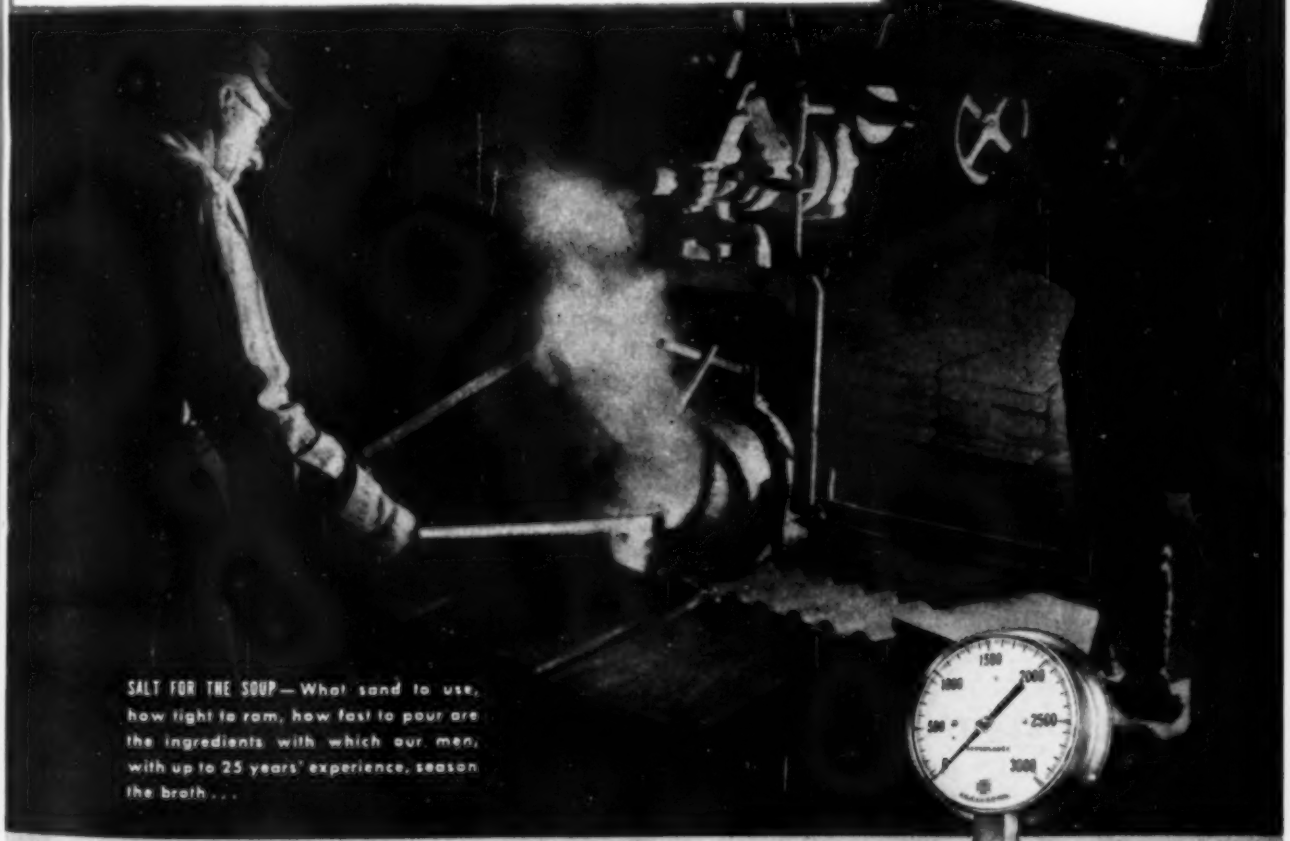

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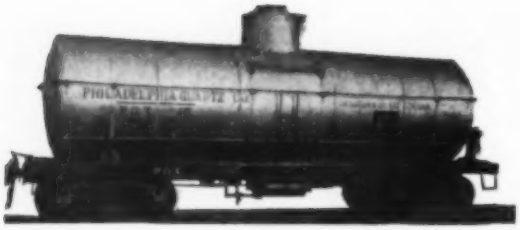

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PQ SILICATES OF SODA

copper while the remaining 3 troughs are countercurrent water washes.

From final washing the tow is fed down a flexible pipe into a centrifuge, the speed of which can be varied to regulate the twist imparted to the tow. Normal twist is 60 turns per m. In the centrifuge, the tow is sprayed with urea-formaldehyde solution and ammonium nitrate as catalyst. During drying on a stainless belt in a chamber dryer at 110 deg. C., this sets up to provide a resin content of 1-2 per cent on the monofil. Much of the tow is delivered uncut to the mattress trade. It is also cut in 20-30 cm. staple lengths.

After the first centrifuging, the cable may be fed to a second centrifuge rotating in the opposite direction to unwind the cable twist but leave a permanent crimp in the individual monofils, imparting an unusual springiness. For horse-hair spinners requiring straight fiber, the tow is dried on drums to keep the individual monofils as parallel as possible.

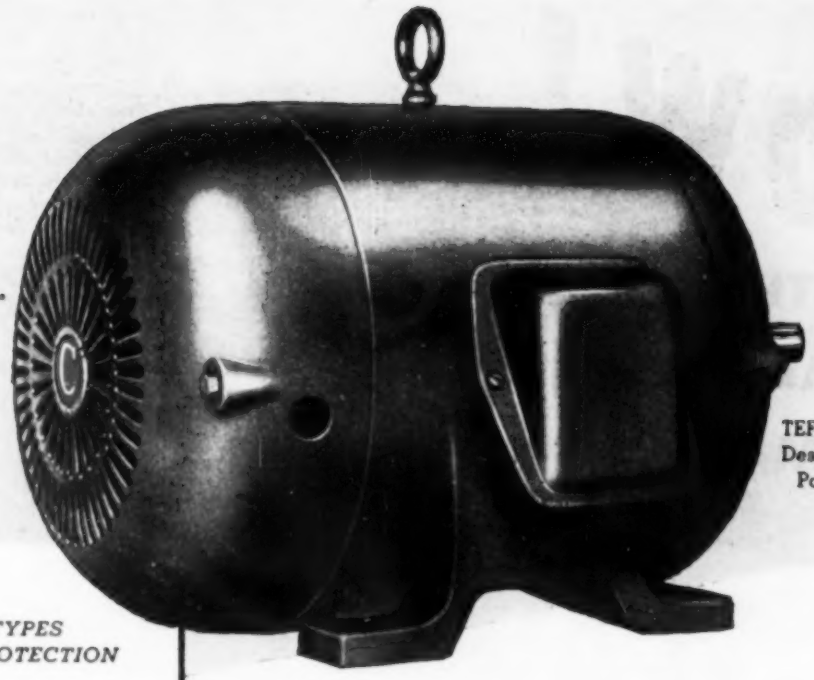
I.G. spent some 7 years on the development of a combined copper and ammonia recovery process, based on the use of a Bakelite type, ion-exchange resin containing active SO_3H groups and known as "Wofatit." Copper when in the form of an alkaline tetramine complex is picked up by the uncondensed hydroxyl groups and can be later released by acid media. Ammonia is recovered by heat and vacuum distillation and the heat supplied to the evaporator is sufficient to maintain the spinning water at its proper temperature.

The recovery plant is constructed largely of wrought iron lined with buna where it would be in contact with acid. Each "Wofatit" unit holds 20 cu. m. of base-exchange to be of the order of 200 to 300 cu. m. per hr. The cycle for the rayon plant unit was 3 days and for the Cuprama plant, 1 day. Thereafter, blue acid is circulated for 10 hr. to regenerate the base and liberate the copper, yielding the copper sulphate solution which is used in the continuous precipitation of basic copper sulphate.

The sand filters are washed with water every 8 hr. and cleaned with waste spinning acid every month. A 90-95 percent copper recovery efficiency was claimed and 50-65 percent ammonia recovery efficiency.

Viscose Process—Germany increased its staple fiber production phenomenally in the years prior to the war. An elevenfold increase was made from 20,000 tons per year in 1935 to about 225,000 tons in 1939. This rate of growth was not maintained during the war. In fact, the figures of I.G. indicate a peak production for 1943 of 233,500 tons, only 8,500 tons over 1939. In 1944, German fiber production was seriously disturbed and in 1945 it will probably not be much above the level at which it started ten years ago. Of the 1943 staple total, approximately 96 percent was viscose staple, with acetate and cuprammonium staple dividing the remainder equally.

Although no figures were available on the production of rayon yarn during the war, it would seem to have increased substantially owing to the production of heavy denier tire yarn. At the Obernburg factory of Vereinigte Glanzstoff, for example, there was a four-fold increase in



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the years between 1938 and 1944 from 3,600 tons of normal rayon to 14,400 tons of tire cord.

Increased rayon capacity was realized in large part by the installation of new methods and equipment for the more rapid preparation and aging of alkali cellulose and viscose, and by the alteration of normal spinning machines. Although German industry has done a large amount of work on the continuous preparation of viscose solution, no producer had succeeded in avoiding batch-processing at the xanthation stage.

Most of the larger rayon and staple plants in Germany have slurry steeping, continuous pressing and continuous alkali-cellulose aging. Judging by alkali-cellulose analyses and the German practice of correcting individual viscose charges, these newer processes are not yet under the precise control of the orthodox process and their efficiency from the point of view of cost and quality could not be determined since the technicians at different factories had very different opinions of them. For example, a comparison of the labor required to produce the viscose for 30 tons per day of staple fiber showed a very substantial savings in the use of the new process. A breakdown of the operators required per 8-hr. shift for all steps from bale handling to dialysis indicates 30 men using the orthodox process and 30 men using the new process. However, at Obernberg, although less labor was required for the new continuous process, there was no decrease in cost because of the higher skill required in workers. Not only are additional electricians and mechanics needed but each operator must be in fact at least an amateur engineer.

Carbon bisulphide recovery is almost universal in the manufacture of staple fiber, and the operation usually occurring before the tow is cut. The Glanzstoff factory at Kassel offers a good example. Rub after-treatment machines are also prominent and are said to be very efficient. The multi-tier staple dryer is preferred by the German industry and single round baling presses are being replaced by the three section presses of Lindemann and Schnitzler.

Pulp Manufacture—Wolfen's production of sulphite pulp is divided about half into the normal dried sheets and pulp flake containing 50 percent water. It is made from beechwood because the latter is plentiful in Thuringia and the Hartz mountains. The fiber of beechwood is too short to make good paper pulp (it has about ⅓ of the fiber length of pine) so the principle competitive use for beech is as firewood, and the low resin content contributes to a high yield (about 43 per cent on a bone-dry wood basis). One important effect of the low resin content is that a digestor charge can be 50 per cent larger than one of pine wood. Wolfen had begun to experiment with drum barking, but most of the logs, varying in diameter from a few inches to over a foot were knife barked and split in the woods.

Digestion is in 250-cu. m. V4A stainless vessels with 2.8-cm. thick walls. The plates were welded together in the plant and the digestors lifted directly into place

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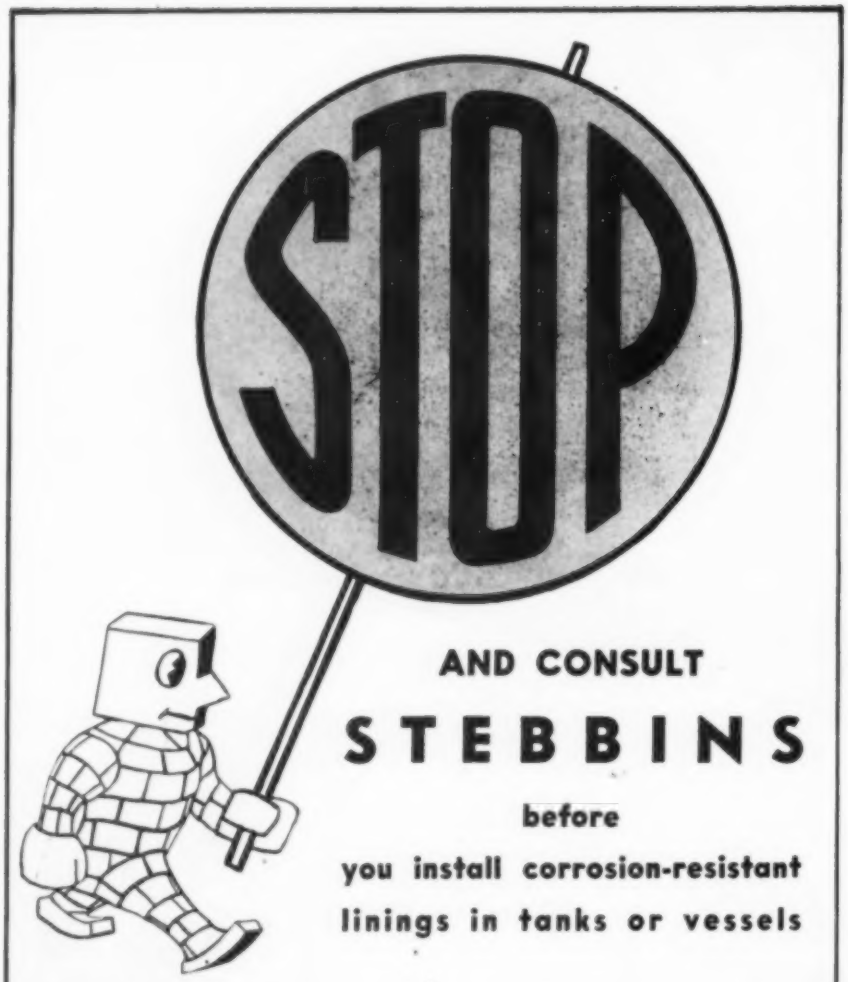

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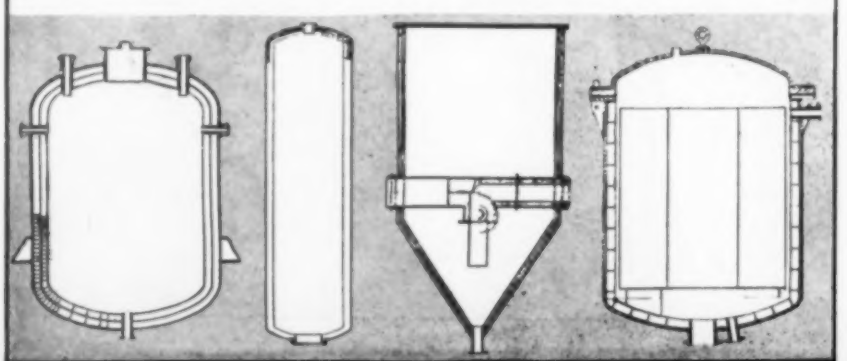

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through large sash in one wall of the building. They are equipped with external circulating lines and steam heat exchangers and have been in service for 9 yr. without any appreciable maintenance. The normal charge is 58,000 to 59,000 kilos of chips with 190 cu. m. of sulphite solution containing 0.9 to 1.0 percent CaO equivalent and 4.5 percent of SO_2 fixed as sulphite. The sulphur burned is 99.9 percent pure being precipitated from coal-gas at Leuna where some 50,000 tons per year were being recovered by the "Alkacid" process. It was stated that the price was higher than that of Italian sulphur. Sulphur dioxide absorption and lime treatment are in a single tower 40 m. high, but poor lime often requires the use of both of the two towers. The total digestor cycle is 20-22 hr.

After cooking the pressure is released from the digestor and the liquor drained off to byproduct recovery of yeast and sulphite-cement. The digestor is refilled with water and the pulp slurry is allowed to drain out the bottom of the digestor by gravity into a washing basin. Following normal separation, filtering and purifying, the pulp is fed to the fourdriniers of either of two paper machines.

The selling price of sulphite pulp was 35 marks per 100 kilos which figures out as 6.3c. per lb., or 3.8c. per lb., depending upon whether the mark was worth 40c. or 24c.

The nitric acid-process pulp was also partly in the form of 50 percent wet flake and partly finished as a thin, creped sheet. The alpha cellulose content was 98-99 percent.

Wood-handling is the same as for sulphite pulp except that chips are cut smaller to assure better acid penetration. V2A Supra stainless digestors of 180-cu.-m. capacity are used, but only two-thirds loaded because of the foaming inherent in the process. The 12-15 percent nitric acid is allowed to heat the mass up to 40 deg. C. and a pressure of 3 atm. is built up to drive the acid into the wood. After about 3 hr. the acid is drawn off and 70-80 deg. C. hot water is added to the digestor. The retained acid in the chips produces a 4 percent nitric acid solution, which after 7 hr. of circulation is reduced to approximately 1 percent. A 4 percent caustic soda treatment and cold water wash in the digestive follow. Draining is by gravity.

Subsequent purification is more circumstantial than with sulphite pulp, a large number of vacuum, cell filters being used. The caustic consumption is 60-70 kg. per 100 kg. of pulp in comparison with 5 kg. used in the sulphite process.

Carbon Bisulphide—There were practically as many methods of recovering carbon bisulphide as there were plants. The simplest arrangement was one in which the tow was carried through a hot-water filled pipe under the after-treatment. None of the arrangements seemed outstandingly superior and all claimed recovery efficiencies ranging from 35 to 40 percent.

The Vereinigte Glanzstoff yarn plants at Kersterbach and Obernburg claimed 30 to 35 percent recovery of carbon bisulphide from bobbins by housing them in at the first hot station and absorbing the

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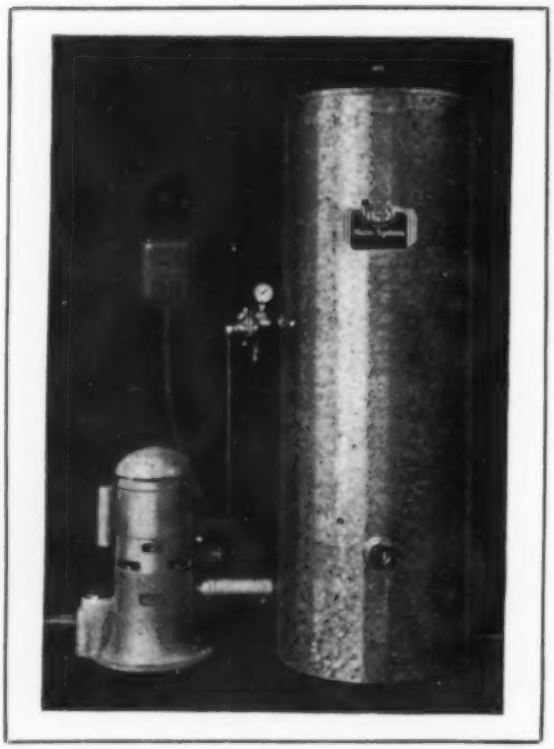

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Thuringischs Zellwolle made its own CS_2 in 60 cast steel retorts lined with fire resisting tile. A life of 18 months was claimed for these retorts. They are heated at 860 deg. C. with brown-coal gas. Beach wood charcoal is used because it does not disintegrate nor give tarry distillates. Some evidence of this was the clean sulphur drained continuously from the CS_2 rectification still and directly reused. The molten sulphur passed down the hot channels at each side of the main retort chamber to enter it at the bottom.

KKK Evaporators—A majority of the German viscose plants used these evaporators made by Kuhnle, Kopp, and Kausch, based on the Vogelbusch system.

The merit implied by such general use appears to reside in the high effect-high velocity features of the equipment. In principle it consists of a V-shaped heating element external to the body of the evaporator, a foam-breaking arrangement in the upper part of the evaporator and external appurtenances such as pumps for vacuum pressure, for increased circulation.

Some of the claimed advantages of the evaporator are small space requirements, high solution velocity, good utilization of heating surfaces, adaptability to special requirements, and good accessibility, and ease of cleaning. The KKK is said to have 2-3 times the specific heat conductivity of the Roberts apparatus and lower energy consumption than Swenson units. Steam consumption as low as 0.25 kg. per kg. of water evaporated is claimed.

Synthetic Fibers—The development of polyamides and fibers from them has progressed slowly in Germany. All but a very small portion of German production of polyamide fibers has been of the omega aminocaprolactam polymers. The maximum attained rate of production of 3,500,000 lb. per year for this fiber (Perlon L) and about 1,000,000 lb. per year of Perlon bristles, though high for a new product is small compared with the rates of polyamide-fiber production in other countries. This slower growth of the lactam fiber, however, may not be the result of poor quality or a less sound development. Germany had access to silk during the war and could meet some of its needs more quickly with silk.

Pe Ce Fiber—I.G.'s after-chlorinated polyvinyl chloride fibers represent a much older development. By 1944, production at Wolfen had increased to about 4,000,000 lb. per year with bristle manufacture (made from polyvinyl chloride, not after chlorinated) at 1,500,000 lb. per year.

INDUSTRIAL AND SCIENTIFIC TECHNICAL REPORTS

THE Office of the Publication Board has published the first index of the Industrial and Scientific Technical Reports released by the Army and Navy. This is the first group of Combined Intelligence Objectives Subcommittee reports which have been declassified for distribution to industry.

Many of these reports are only an evaluation of plants investigated or inter-

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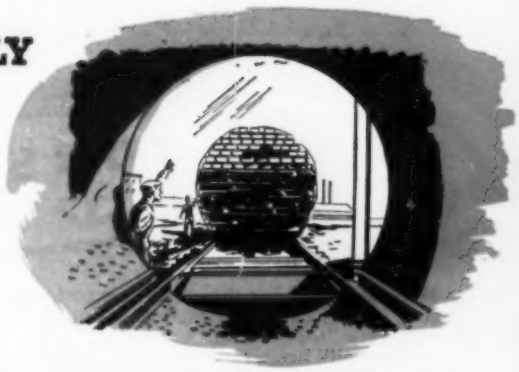

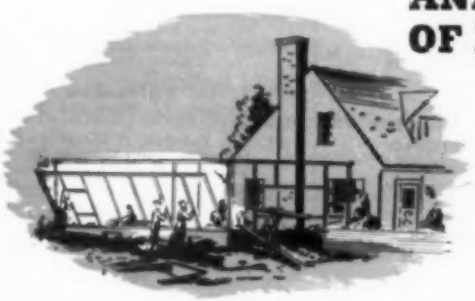

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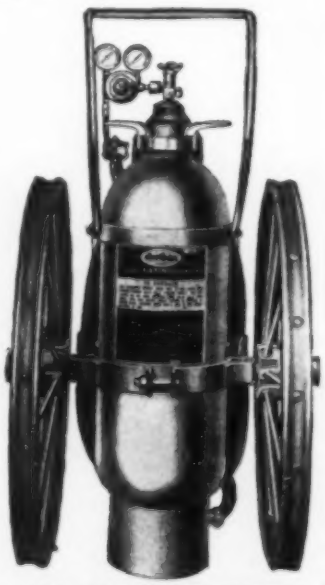

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views with German scientists and contain little technical information as to the process or processes used.

At the time of release OPB said that all would be ready by November 16. In ordering any of the reports, send check or money order made payable to the Secretary of Commerce. No other form of payment will be accepted. All orders should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C.

The index, slightly condensed for *Chem. & Met.* readers, is given below and includes index number, number of pages, and price for each report.

1. Account of Prof. R. Kuhn on "3065," a Benzil Derivative. 5 p., 10c.
2. Preliminary Oil Team Report on I. G. Farbenindustrie Heidelberg. 5 p., 10c.
4. Information on a Material Possibility Used for in Jet Propulsion. 1 p., 10c.
5. Further Details on Synthesis of "3065." 6 p., 10c.
6. I. G. Production of Synthetic Fatty Acids. 3 p., 10c.
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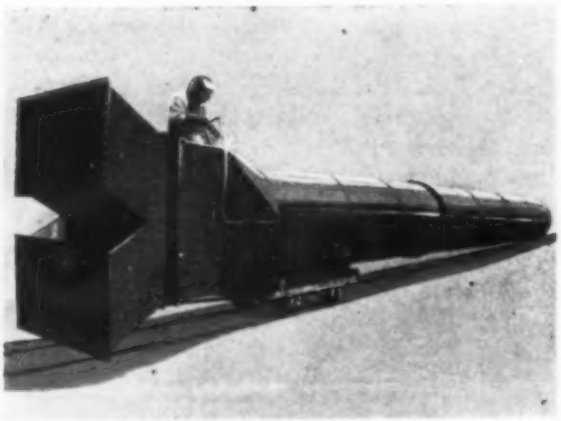

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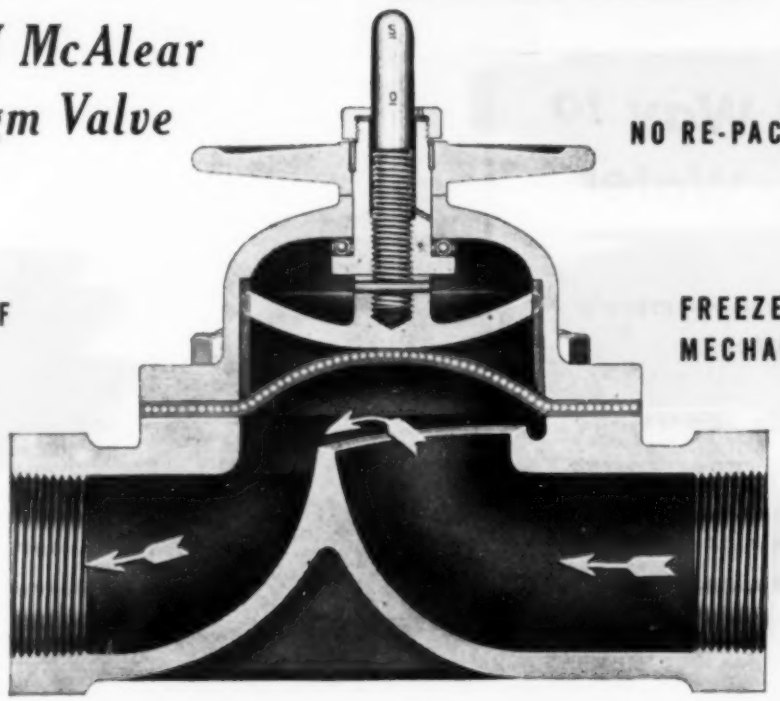

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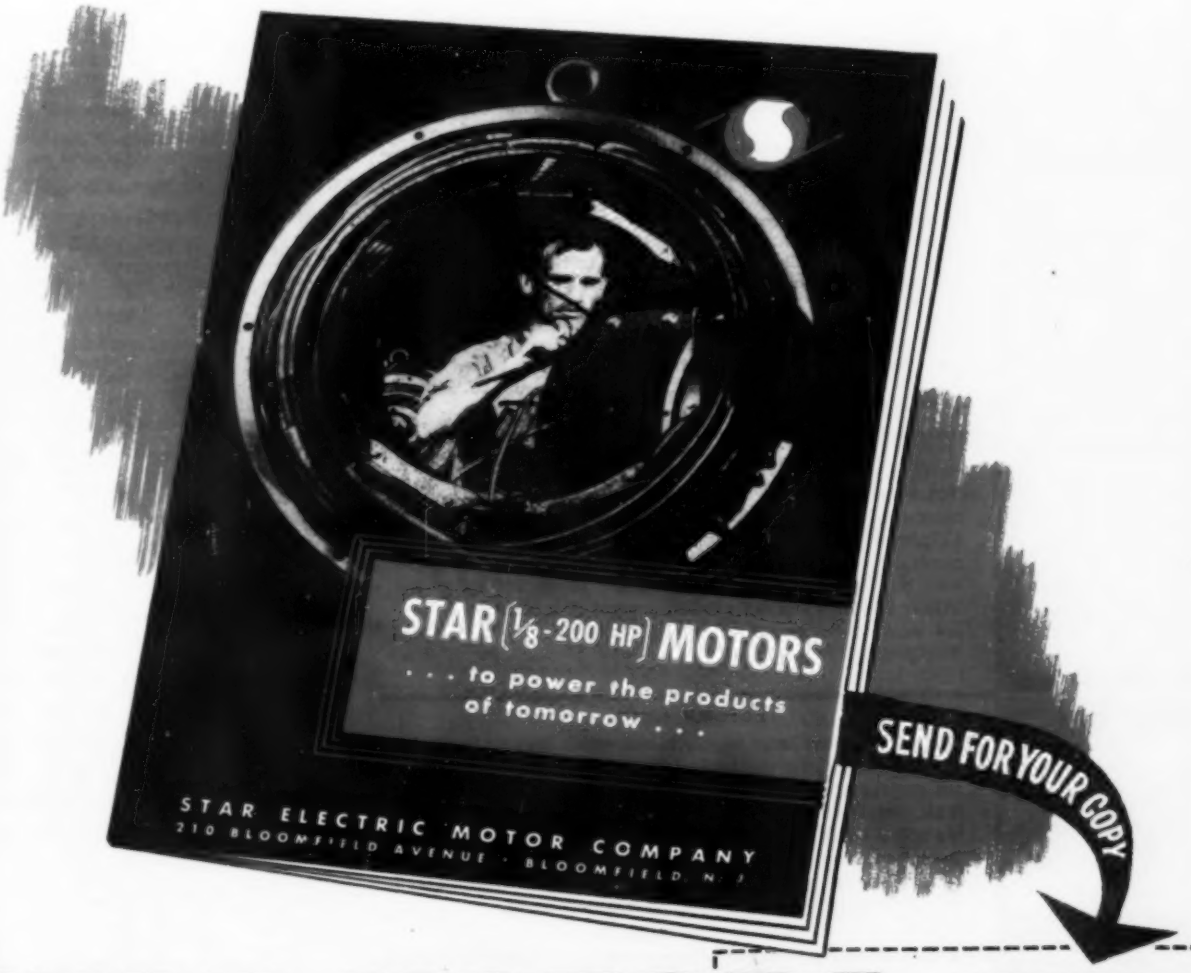
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Partner and Technical Director, Respectively
Pittsberg Chemical Co., Vernon, Calif.

IT WAS DURING 1941 that the Pittsberg Chemical Co. began production of potassium metabisulphite at its plant in Vernon, Calif., thus becoming the second of the two known domestic producers of this chemical. Potassium metabisulphite (familiarly known as pot meta) is actually the potash cousin of anhydrous bisulphite of soda. The two products have much in common, especially their corrosive action on most processing equipment.

In theory, nothing could be simpler than the chemical reaction by which caustic potash is neutralized with bisulphite solution and the resulting normal sulphite saturated with SO_2 to yield pot meta. In practice, there are more complicated factors than the chemistry involved—the problems of corrosion. Some of the handbooks on corrosion make it appear that a simple product like potassium metabisulphite would be no problem to handle, that any one of a dozen or so materials of construction could be used. Maybe that is true, but of all these materials only two or three would be economical in plant practice, only one would be most economical. It is the chemical engineer's job to search out that "most economical" material from all the chaff or "not quite good enough."

Actually, the complicating factors in this little game of corrosion hide-and-seek are legion. They include acidity or alkalinity; concentration and physical state of each raw material, intermediate product, final product and byproduct; temperature and sometimes pressure; time of contact; combination of physical states; catalytic action; type and amount of agitation and, of course, the nature and combination of construction materials used. Take the very simple reaction:

$$A + B = C + d$$

in which A and B are the raw materials, C is the principal product, and d is the only byproduct. In selecting a suitable vessel for carrying out this reaction on an industrial scale, any one of up to some 20 different factors could conceivably cause trouble. Most of these factors must, at one time or another, be determined experimentally. Fortunately, the data in the literature on corrosion are rapidly becoming more complete; the great need now is for more quantitative information.

Chemicals Involved in the Manufacture of Potassium Metabisulphite

Key Used in Flowsheet	Chemical	Remarks
1	Sulphur dioxide	Liquid and gas.
2	Sulphurous acid	Very corrosive
3	Caustic potash	As 50 percent and less.
4	Potassium sulphite	Essentially neutral.
5	Potassium bisulphite	Highly corrosive to iron.
6	Potassium metabisulphite	Moderately corrosive.
7	Potassium sulphate	Small amounts throughout system.
8	Oxygen	At high drying temperatures.
9	Sulphur	At high drying temperatures.
10	Ferric hydroxide	Precipitated.

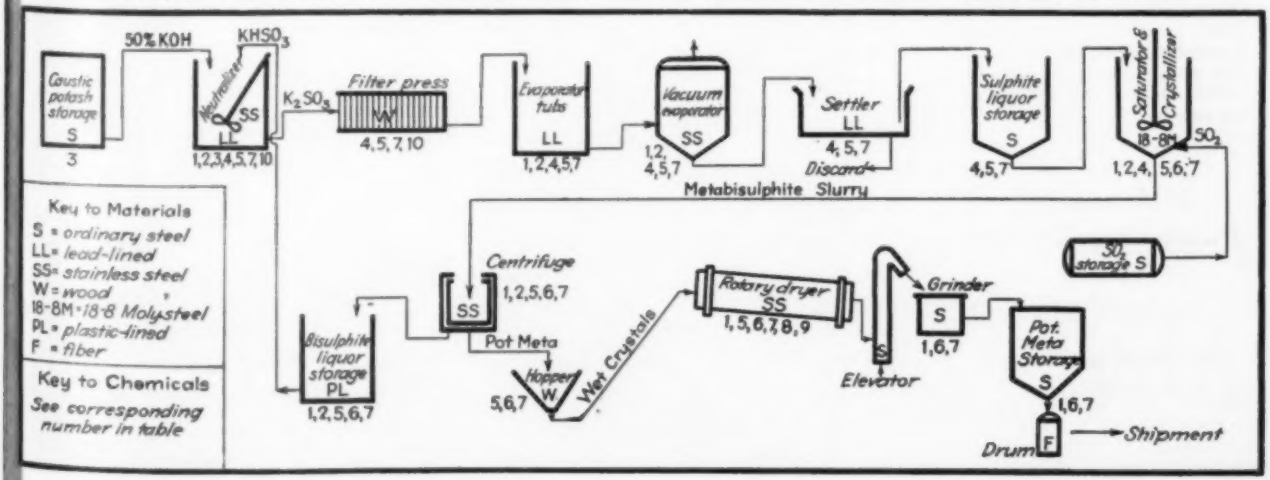
Refer to flowsheet to find out in which pieces of equipment each of these chemicals does, or can, occur.

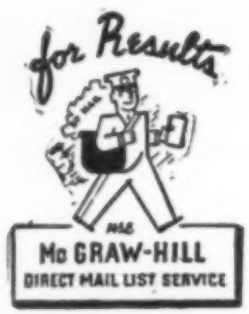
THE CASE OF POT META

When this firm decided to manufacture potassium metabisulphite a thorough study was made of the basic corrosion problems, since we knew that some firms had often had considerable trouble with handling related products. We wanted to keep our books clear of this insidious, insatiable "cost of contamination." Some of the chemicals that are handled or could, under certain conditions, be formed from side reactions in the manufacture of potassium metabisulphite have been tabulated here.

Principal raw materials used in our method of making pot meta are 50-percent caustic potash and a bisulphite solution from the neutralization of normal potassium sulphite with liquid SO_2. The caustic potash is stored in ordinary steel tanks from which it is pumped into the

Process used by Pittsberg Chemical Co., one of two domestic producers, for manufacture of potassium metabisulphite. Materials of construction are indicated by letter; chemical products and possible byproducts, by number





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neutralizing tank. Here the small amounts of iron compounds are converted into ferric hydroxide. As little as 0.009 percent iron in pot meta will cause some yellow coloration in the crystals; the trade demands an iron-free, white product.

Actually, the neutralizing liquor contains some bisulphite, excess SO_2, and a host of byproduct chemicals in small amounts. Acidity of the liquor is about pH4 and the $KHSO_3$ content corresponds to saturation. The neutralizing tank is lined with chemical lead; wood proved unsatisfactory because of the acidity and dehydrating effect. The agitators are either stainless steel or lead coated. Care must be taken to provide good agitation and always to have an excess of bisulphite in the vessel, otherwise the caustic potash will dissolve some lead, an impurity particularly objectionable for the food or photographic-grade product.

Neutralized liquor, now having a pH of about 6.1 and consisting essentially of 35-percent normal potassium sulphite together with a slight excess of bisulphite, is pumped through a wood plate-and-frame press to remove precipitated iron and other solid impurities. The filtrate goes to the evaporator feed tanks, which must be lead-lined since the hot liquor is not completely neutralized and has a dehydrating effect on wood. Iron pick-up must be carefully avoided.

The vacuum evaporator, in which the concentration of normal sulphite is raised to approximately 40 percent on a weight basis, is stainless steel. The heat exchanger is 18-8 Moly steel, use of which is largely necessitated by the increased corrosiveness of bisulphite and liberated SO_2 at the higher temperature. Maximum temperature in this step is about 160 deg. F.

Settling tanks, in which precipitated salts such as K_2SO_4 and sludge settle out, are rectangular in shape and lined with lead. Temperature of the solution is now about 125 deg. F. The storage tank for the settled liquor, now containing only normal sulphite and essentially neutral (pH about 6), is made of ordinary steel.

MAKING META FROM NORMAL

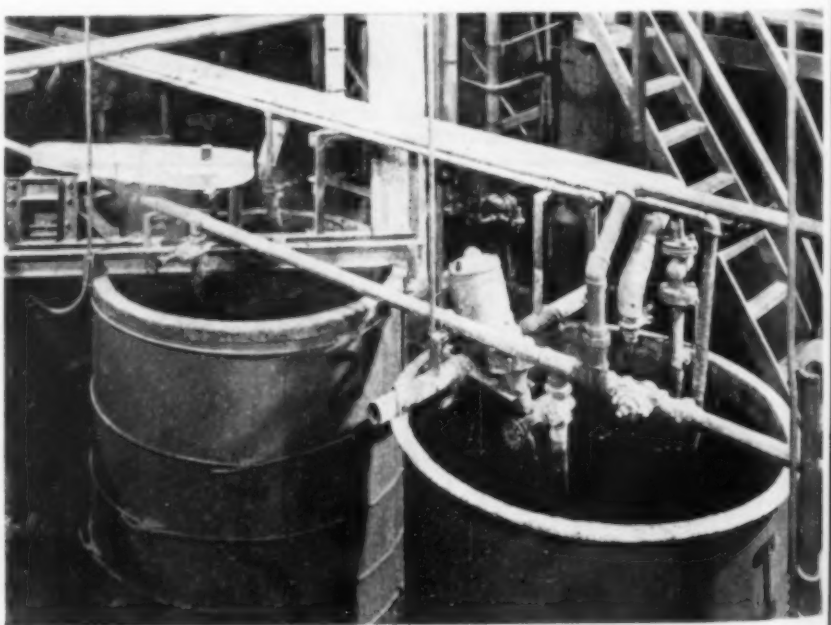
Normal potassium sulphite liquor is pumped into the heated saturator into which SO_2 is fed, with constant agitation, until the chemical absorption of SO_2 is complete and the normal sulphite is converted into the meta compound. The pH shift during the reaction is from 6 to 4; the maximum temperature is 195 deg. F.

Liquid SO_2 is stored in the customary iron or steel cylinder. The saturator-crystallizer is a jacketed 18-8 Moly stainless steel vessel. After several years of constant use, attack on this vessel and stainless steel lines has been so slight that the shine of the steel has not been taken off. An 18-8 Moly pump has shown no corrosion after four years, whereas an ordinary 18-8 sleeve was corroded out within a week. The slurry of potassium metabisulphite crystals is then cooled and dropped into a centrifuge having a stainless steel basket.

Cooled liquor from the centrifuge contains dissolved $KHSO_3$ and is still very corrosive to ordinary steel. The bisulphite storage, therefore, consists of a steel tank lined with a plastic coating of the urea-formaldehyde type. This type vessel provides the necessary protection against corrosion and contamination and yet is cheaper than one of special stainless steel. This bisulphite liquor is recycled to be neutralized with caustic potash to provide normal sulphite.

Wet meta crystals pass through a stainless steel continuous rotary dryer at about

Lead-lined neutralizer (left) and evaporator-feed tanks; agitator is stainless



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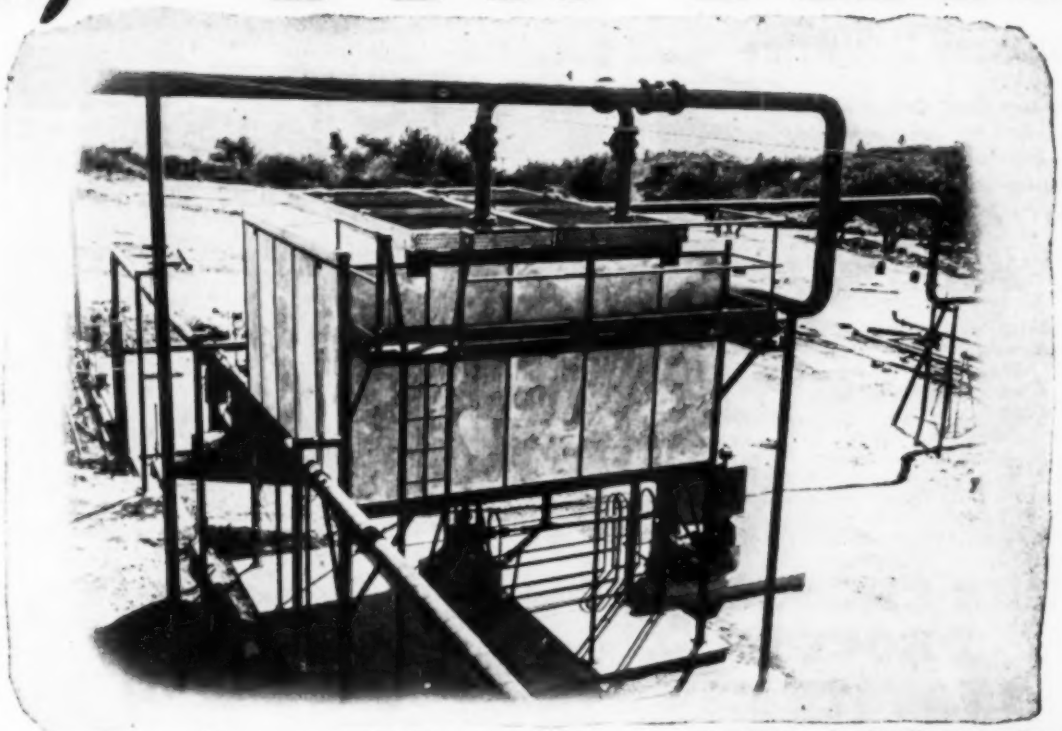

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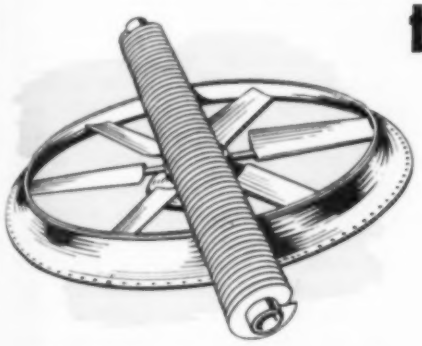

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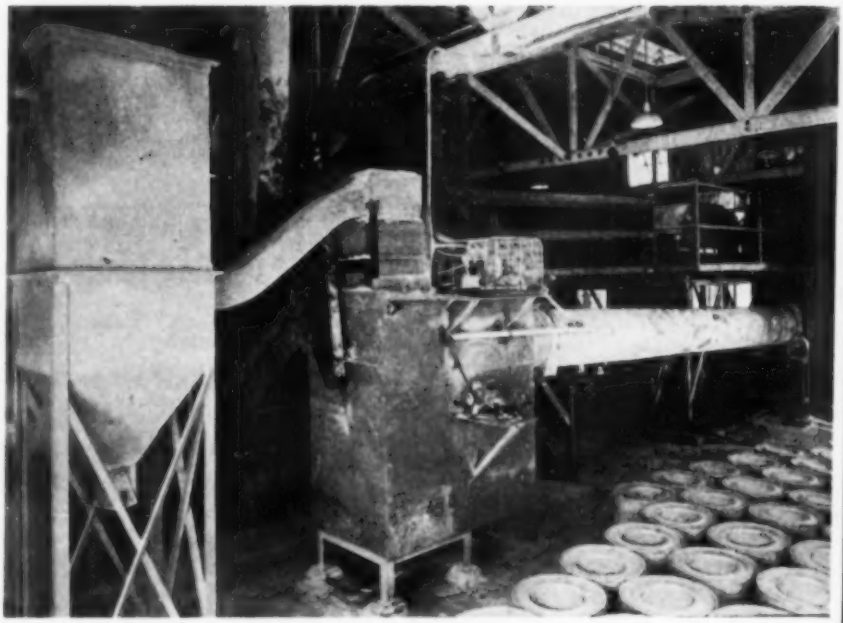

Stainless steel continuous rotary dryer used in production of metabisulphite

135 deg. F. The unit is about 2.5 ft. in diameter and 20 ft. long; the crystals enter with 5 percent moisture and leave with less than 0.1 percent moisture. Pot meta is sensitive to temperature so that good control of the dryer is necessary. Once decomposition starts it will continue spontaneously in the presence of air since the free sulphur liberated burns to SO_2 and thereby produces sufficient heat to free additional sulphur. At ordinary temperatures, metabisulphite is quite stable.

From the dryer, the granular pot meta, which dissolves more readily than coarse crystals, goes to a steel elevator which feeds a rotary hammer mill grinder. The product is stored in regular steel hoppers from which it is packaged into fiber drums for shipment. The final product must analyze 55 percent SO_2 and not more than 0.009 percent iron. Potassium sulphate, which occurs throughout the entire system, must be kept to a minimum in the product in order to maintain the required strength.

A large percentage of the potassium metabisulphite produced by this firm goes into wineries for use as a fermentation arrester and settling agent. Purity, especially from soluble lead salts, is obviously of prime importance. In fact, it is the higher purity of pot meta that gives it an advantage over anhydrous bisulphite of soda for this purpose. In addition, however, the potash salt is advantageous in clarification, and many wineries in this country insist on the use of this chemical. It is especially popular in the wineries of South America. The next largest use of pot meta, as a preservative for photographic solutions, also requires high purity; iron contamination would be disastrous in this use. Some pot meta is now being used as a substitute for SO_2 and in the treatment of dried fruits.

NEWS BRIEFS

A SYMPOSIUM on materials of construction will constitute the final session of the 38th annual meeting of the American Institute of Chemical Engineers, Chicago, December 17 to 19. The materials of construction symposium will be held on the morning of Wednesday the 19th. Subjects of the papers to be presented and their authors are as follows:

"Glass," by J. R. Blizard, Corning Glass Works; "Karbate," by M. R. Hatfield and C. M. Ford, National Carbon Co.; "Silicones," by W. R. Collings, Dow-Corning; "Synthetic Rubber and Plastics," by M. G. Fontana, Du Pont; "Fiberglas-Reinforced Plastics," by G. Slater and H. W. Collins, Owens-Corning Fiberglas Corp.

FIVE educational lectures on the subject of corrosion are planned by the American Society for Metals as part of its technical program in the National Metal Congress, Cleveland, February 4-8. They will be presented in the afternoons of the five days during Metal Congress week. Subjects of the lectures and the individuals who will deliver them are as follows:

"Basic Principles of Metallic Corrosion," C. W. Borgmann, University of Colorado; "Effect of Composition and Environment on Corrosion of Iron and Steel," C. P. Larrabee, Carnegie-Illinois Steel Corp.; "Corrosion Resistance of Stainless Steels and High Nickel Alloys," W. O. Binder, Union Carbide and Carbon Research Labs.; "Corrosion of Light Metals (Aluminum and Magnesium)," E. H. Dix, Jr., Aluminum Co. of America; "Corrosion of Copper and Brass," H. L. Burghoff, Chase Brass & Copper Co.

NATIONAL Association of Corrosion Engineers will hold its 1946 annual convention in Kansas City, Mo., May 7-9.

FROM THE LOG OF EXPERIENCE

DAN GUTLEBEN, Engineer

It has been almost a year since Dan broke the news that he'd packed his duffel and said his last goodbyes to the Pennsylvania Refinery, foot of Shakamaxon Avenue, Philadelphia, Pennsylvania. For 24 years the Refinery had been the scene of his labors and it was time for a change. In particular, it was time to return to his native California. So for six leisurely, rambling weeks last summer Dan wound his way across the country and finally came to rest in San Francisco. There he plans to make his home and give uninterrupted attention to a lifelong hobby of recording the perambulations of America's sugar tramps.—*Editors*

TRANSFER of the chronicler from the active job at the Pennsylvania Refinery to "emeritus" status at the old homestead in San Francisco gave opportunity through cooperation of the gas rationing board to cover the sugar belt across the country. The "sugar tramps" were everywhere making heroic effort to save the psychological price of nickel a pound for their product. By the time the price of supplies and labor have advanced, the boys have found an improvement in the machines or technique or have increased the output.

Just now it is the agronomists' turn to make a contribution. The beet seed is a shapeless thing containing not one but numerous germs. During the past hundred years of effort the engineers have been unable to devise a machine having a high enough IQ to drop the variety of sizes of seeds at a uniform spacing. The grain drill therefore sows 10 lb. of seed per acre and the surplus sprouts from the multi-germ seeds have to be removed by distasteful stoop labor, accompanied by a setback to growth. Now the agronomists, under the leadership of Professor Bainer of California, have hit upon the device of segmenting the seeds into single-germ units and are coating them with a mixture of inert material including fertilizer (baby food) so as to secure a uniform size resembling large homeopathic pills. When this has been fully accomplished, stoop labor and the hoe will disappear from the beet fields. The hours of farm labor have already been reduced by one-half and the quantity of seed by two-thirds.

A GREAT WASTE is the nine-month period of idleness of beet sugar factories which operate only during the harvesting period. When this gap is filled, the nickel price will acquire a strong position. The goal is to promote sugar factories (beet or cane) into chemurgical plants to process not only for sugar but for all of the things that Nature's great factory produces on the farm and thus to maintain all-year operation of the refineries.

As early as 1900 this was attempted at Pekin, Ill., where Fuehrmann & Hapke built a sugar factory with extra equipment for processing corn. Farmer apathy toward stoop labor and the superior profits from corn squeezed out the beets, and the plant became a unit of the Corn Products Refining Co.

Now comes Jim Walsh with a process that produces dextrose and protein out of wheat at the beet sugar factory which he leased at Holland, Mich. And at the old factory at Waverly, Iowa, corn is now converted into malt sirup and sold to bakers for maintaining moisture in bread and to brewers for improving the alcoholic content. Last year the beet sugar plants sliced and dried 300,000 tons of surplus potatoes. The factory at Santa Ana, Calif., processes a crop of beets shipped from Imperial Valley and follows with a later crop grown nearby. Efforts have been made for years to dry the beets for subsequent processing in central factories, and in Russia it is now proposed to erect many concentrating plants to thicken the raw juice for storage and shipment to the refineries.

At Ottawa, Ohio, Joe Eckert blends fertilizer for the neighboring farmers and buys their green alfalfa for conversion into meal. This latter employs little of the equipment but uses the men. A factory at Decatur, Ind., and another at Belmond, Iowa, have been converted to soybean processing. More attractiveness will become attached to beet culture when the gas-powered tractor with the comfortable seat removes the necessity of getting up two hours before breakfast to feed the horses.

IN THE PLANT of the Farm Crops Processing Corp. at Omaha, Bro. Bill Phillips produces over 85,000 gal. of alcohol daily out of a variety of grain, and frequently he doesn't know whether it is to be corn or rye until the cars are on the siding and Master Miller Jess Carter dispatches the materials according to quality. Bill's huge plant fits into the Nebraska landscape like iron furnaces fit into the coal-filled hills of Pennsylvania.

TO PROVIDE service, maintenance and emergency repairs for the big and little chemurgical plants there has grown up in Omaha an "institution" in the way of an acre of versatile machine shop. It was dramatically developed by rugged Walter Charnley of Minnesota. He started as an itinerant miller and even now his fingers bear the blue stain of steel splinters from the millstone dressing pick. Through his ingenuity, many special machines have been devised to help Nebraskans scratch a living from their soil.

He cooperates with Nature. When a hen reaches the stage in senility when she can no longer perform her God-given task, she is placed in a crate and fed a milk diet, but, thus caged, she exhibits no ambition to eat. For her benefit, Walter builds an apparatus that resembles a large grease gun. This machine measures out a fixed quantity of feed and, by means of a small hose and some slight manual dexterity, an operator fills the crop. The guest registers contentment and in eight days the old hen becomes a spring chicken for the market. Further feeding after the maximum in weight and tenderness is attained is useless, as in the case of a steer or a hog when satiety is reached.

DURING A RECENT TRIP to the East to purchase new tools, Walter picked up a shot gun of rare beauty having the figures of dogs and birds inlaid in gold by Tiffany. The gun was valued at $700 but the auctioneer knocked it down for $400. To square accounts at home Walter gave his wife three $100 bills. She bought war bonds.

FURTHERMORE, Walter makes a device for puffing cereals. This is a short, rotating cylindrical container, 2 ft. in diameter, having spherical ends, in which grain with a 20 percent moisture content is heated by the application of a gas flame on the outside. When the steam has reached a pressure of 200 lb. the gate is suddenly opened and the grain explodes like a sponge.

Walter's "ersatz" castings are a blend of selected scrap tempered with automobile tire rims. A neighbor, essaying competition, used mathematics in developing his design but no empirics. The result under 200 lb. of steam pressure was painful and disastrous.

Incidentally, the process of puffing seems somehow to separate the starch from the protein and Walter thinks some wizard might find something of value in this peculiarity.

AN EXTRAORDINARY sugar tramp is Charlie Collier. He has made sugar in nearly every country in the Western Hemisphere including a three-year assignment as superintendent of a large South American sugar estate. In the early Twenty's the Dyer Co. of Cleveland sent him to Brazil to open a contracting office for sugar mills and he did some efficient spade work that brought business to the

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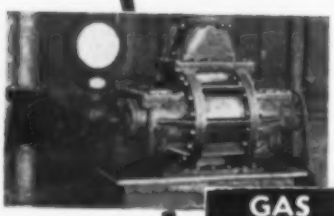

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House. He found it expedient to make an occasional trip to New York to convene with Henry Hunter (now sales manager of General American Processing Equipment) who was then the manager of the cane mill department.

At the Astoria, Charlie's tropical tan, his Pan American cosmopolite manner, and his affected ignorance of English attracted a pair of venturesome young sorialites. Henry obliged by acting as interpreter for Charlie's Spanish and introduced him as Señor Don Carlo Colyare! A party was arranged to present the important Spanish grandee. Everything progressed satisfactorily until Charlie paired off with one of the young ladies. In his eagerness to produce an impression and peradventure to pave the way for further parleys, his sign language failed him and he suffered a slip of the tongue. This let the cat out of the bag and the imposter was dropped like a hot potato.

BILL MANTEY, assistant superintendent of the Caro, Mich., factory, smokes one big black cigar per hour and he works like a horse. Daughter Caroline smokes cigarettes. Bill confided to the chronicler that he promised Caroline the gift of Grandfather's gold watch if she would keep little Bill, now three, from tobacco until he reached his 21st birthday. Caroline answered that she feared tobacco less than the liquor that her dad used!

Bill's father Rudolph, was a mechanic in one of the Brooklyn refineries in the 1890's. He moved to Caro to be with his brothers who were prominent farmers there. When the sugar house was built in 1899 he joined the mechanical crew. One day Boss Henry Niese of G.H.Q. in New York came walking through the house and spied Rudolph, and presto there took place a spirited reunion between the head of the technical department of the widely dispersed Amer. Sugar Ref. Co's. sugar empire and the modest mechanic of Caro. Niese was that kind of fellow.

PIONEER CHEMIST LINDFORS, of the Michigan Sugar Co., grew up under the order of Dutch Treat. He enjoyed conviviality. When thirst prodded him he motioned the gang to take their places around the table and then he ordered a single "super" of beer. He smacked his lips in appreciation of congenial company. Each guest, paying for his own, confined himself to a single glass, the consumption of which accommodated several rounds of mirth-provoking anecdotes.

Lindfors' special weakness was caviar. The delicacy was not freely obtainable, so he provided himself with a stock from which he drew as craving demanded. One day chief engineer Clayton Wanless caught a handful of small mosquito fish and added them to Lindfors' partially emptied can. In the meantime the boys had surreptitiously added a jigger of whiskey to the chemist's "super." At the conclusion of the drink, when ritual called for a pinch of caviar, Lindfors opened the can. His eyes bulged out in great amazement and he hollered "Look boys the eggs have hatched."

NAMES IN THE NEWS

D. B. Keyes

W. H. Bowman

F. C. Frary

Donald B. Keyes, director of the Office of Production Research and Development in WPB and since 1926 in charge of the chemical engineering division of the University of Illinois, has resigned to become vice president in charge of research for the Heyden Chemical Corp. He will make his headquarters in New York.

G. V. Woody has been appointed to succeed **R. C. Newhouse** as manager of the Allis-Chalmers basic industries department. Mr. Newhouse will be retained as a consulting engineer. Mr. Woody has been manager of the Allis-Chalmers district office in Pittsburgh since 1934.

W. B. Reinhart, formerly chief of the tar acid unit of the Chemicals Bureau of WPB, has joined the William D. Neuberg Co. of New York to be manager of tar chemicals. Mr. Reinhart, before joining WPB in May 1942, was with Reilly Tar and Chemical Corp. in New York.

Ralph F. Phillips has been appointed assistant scientific director of the Sugar Research Foundation, New York. Dr. Phillips was formerly assistant professor of organic chemistry at the University of Utah.

E. Clifford Williams has been appointed vice president in charge of research of Schenley Distillers Corp. Dr. Williams has assumed responsibility for coordinating and directing all scientific research and development of the parent company, its subsidiaries and affiliates.

Everett J. Boothby, vice president and general manager of the Washington Gas Light Co., was elected president of the American Gas Association at its annual meeting in New York last month.

A. P. Frame, director of the refining division of the Petroleum Administration for War since June 1944, has resigned to return to Cities Service Co. where he becomes vice president of Petroleum Advisers, Inc.

Wm. H. Bowman has been appointed market development manager of Jefferson Chemical Co. where he will be responsible for organizing market research, market development, and sales and technical service facilities. Dr. Bowman was previously with Westvaco Chlorine Products Corp.

R. M. Burns, director of research of Bell Telephone Laboratories, has been awarded an honorary degree of doctor of science by the University of Colorado.

E. M. Schoenborn, formerly associate professor at the University of Delaware, has been appointed head of chemical engineering at North Carolina State College at Raleigh, N. C.

Albert H. Cooper has been appointed professor of chemical engineering at the University of Denver, not Kansas as erroneously reported here last month.

John C. Leppart has been appointed assistant to the operating vice president of the Southern Alkali Corp., Corpus Christi. He has been deputy chief of the inorganics branch of the Chemicals Bureau of WPB since January 1942.

James O. Lewis, consulting petroleum geologist, has been awarded the Anthony F. Lucas Gold Medal for 1946 for "distinguished achievement in improving the technique and practice in finding and producing petroleum." Presentation will be made in Chicago in February by the American Institute of Mining and Metallurgical Engineers.

Chester A. Snell has joined the staff of Foster D. Snell, Inc., Brooklyn. For the past three years Dr. Snell has been connected with the Chemical Development Division, Aluminum Co. of America.

William F. O'Connor has been appointed to the newly established post of professor of safety engineering in the New York University College of Engineering.

Francis C. Frary, director of research of Aluminum Co. of America, has been elected to receive the Perkin Medal, awarded annually by the American Section of the Society of Chemical Industry. Presentation of the medal will take place in New York January 11.

H. H. Deppeler, chief engineer of the Metal & Thermit Corp., last month received the Samuel Wylie Miller Memorial Medal for the year 1944. The Miller medal is awarded annually by the American Welding Society for conspicuous contribution made to the advancement of the welding and cutting of metals.

Victor E. Wellman will join the staff of the development department of the Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., on January 1. He is presently connected with R. W. Greeff & Co., Inc., New York.

G. E. McClellan, manager of the Spruance rayon plant of the E. I. du Pont de Nemours & Co., Richmond, Va., has been appointed director of production of the Rayon Division. He replaces **Arlington Kunsman**, who has been made assistant manager of the Cellophane Division. **A. B. Walmsley, Jr.**, manufacturing superintendent under Mr. McClellan, becomes manager of the Spruance plant.

Leon C. Bibber, welding engineer for the Carnegie-Illinois Steel Corp., has received this year's award of the Lincoln Gold Medal and Certificate awarded annually by the American Welding Society for the greatest original contribution to the advancement and use of welding.

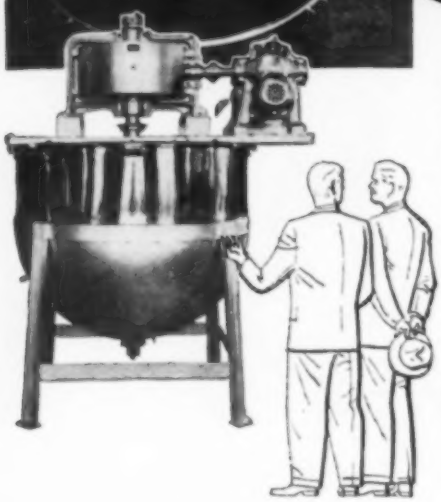
E. T. Powers, formerly with Monsanto Chemical Co., has joined the Celanese Corp. of America to coordinate employment of technical personnel.

W. D. Turner, since 1929 a member of the department of chemical engineering at Columbia University, has resigned to be-

LEE

CORROSION RESISTANT

*KETTLES AND PROCESSING EQUIPMENT



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and HERE'S WHY

• One piece construction heating sections (patented) of high test cast iron and will withstand steam pressures up to 250 lbs.

• No soldered, brazed, welded or expanded connections to become loose or develop leaks.

• No electrolysis to cause corrosion, breakdowns, leaks or heating failures. That's why GRID Unit Heaters withstand the corrosive fumes in chemical plants without maintenance. In many plants where the corrosive fumes of HCl and Cl_2 are prevalent GRID Heaters have been operating for 8 or 10 years without maintenance. Complete information upon request.

New booklet "Corrosion in Unit Heaters" contains information you should know before you install a unit heater.

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It's free upon request. Send for it today.

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WAUSAU • WISCONSIN

Offices in all principal cities.

come technical director of Florida Chemical Research, Inc., and Airkem, Inc.

George Barsky, after more than three years of active duty as an engineer specialist with the U. S. Navy, has returned to consulting practice with Barsky & Strauss, Inc., New York, consulting chemists and engineers.

E. N. Kemler has been appointed head of the newly created engineering research division of the Southern Research Institute, Birmingham, Ala.

Edward A. Reineck has joined the staff of the Chemicals Department of the Quaker Oats Co., Chicago, where he will assist in the development of new applications for furfural and its derivatives in the resins and plastics industry.

Perley S. Wilcox, chairman of the Tennessee Eastman Corp. board, has been elected chairman of the board of directors of the Eastman Kodak Co.

J. Albert Raynolds, formerly technical director of vitamin oil operations for Atlantic Coast Fisheries Co., has assumed his new duties as technical consultant for National Oil Products Co., Harrison, N. J.

Charles T. Evans, Jr. has been named chief metallurgist for the Elliott Co., Jeannette, Pa.

William A. Mosher, technical assistant to the director of research, Hercules Powder Co., has resigned from the company to accept the position of head of the chemistry department at the University of Delaware.

Lorain Szabo has resigned from the technical staff of Alabama Ordnance Works to become associated with Southern Research Institute, Birmingham, Ala.

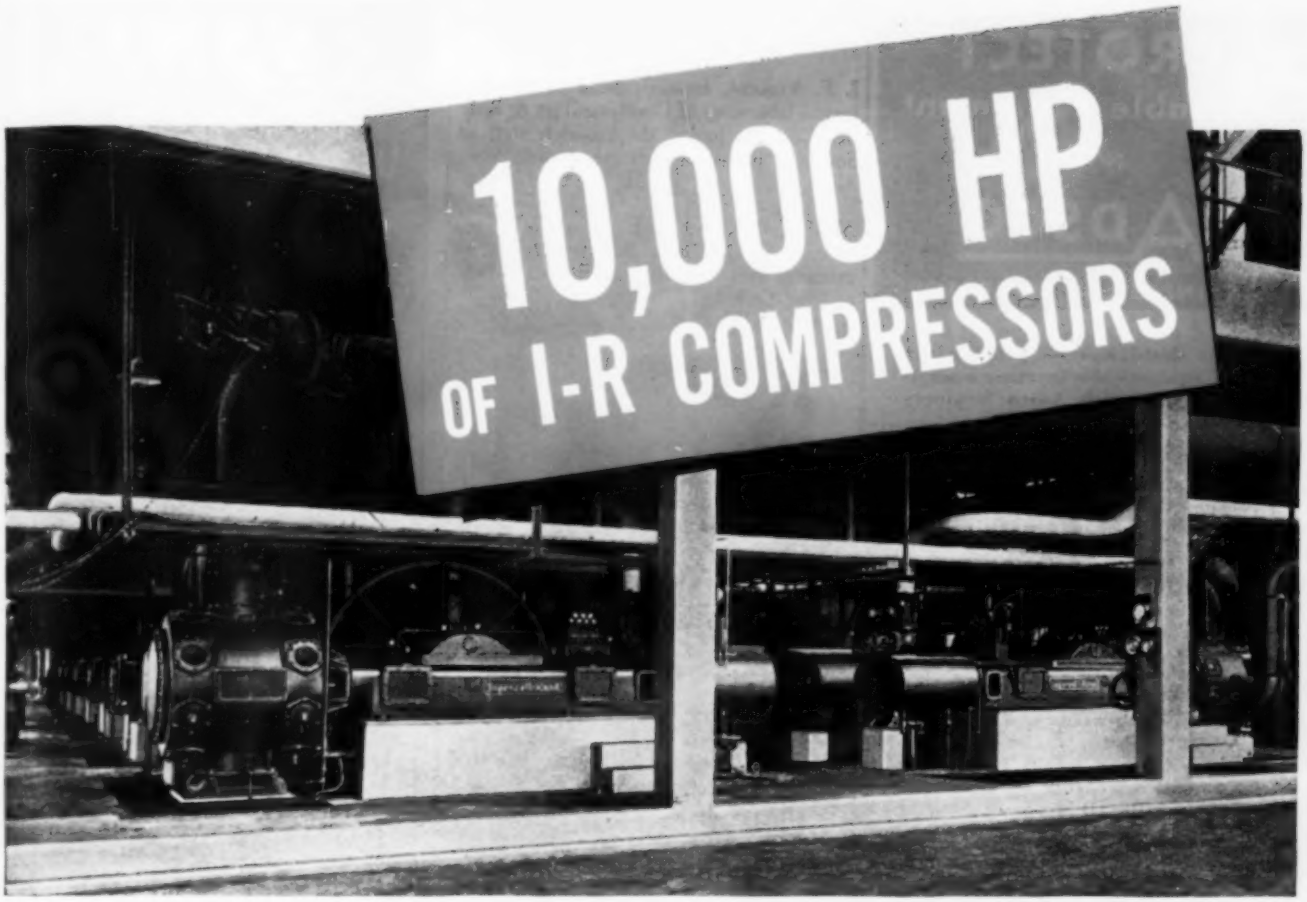
Robert W. Shortridge and **Lorenzo D. Moore** are recent additions to the technical staff of the Midwest Research Institute, Kansas City. Dr. Shortridge was formerly with the Monsanto Chemical Co., Dayton, and Mr. Moore was formerly with the Koppers Co., Kearny, N. J.

Walter O. Simon, manager of the Hanford Engineering Works, Richland, Wash., has been appointed manager of the Yerkes rayon plant of the E. I. du Pont de Nemours & Co. at Buffalo, N. Y. Mr. Simon took over his new duties on October 15, succeeding **Cantwell Clark,** who became manager of the nylon plant at Martinsville, Va.

Lewis B. Swift, president of Taylor Instrument Cos., Rochester, N. Y., has been elected to the board of directors of the Pfaudler Co.

Hugo Klein has been advanced to the position of vice president of the Charles Bruning Co. in charge of all chemical production and research activities.

Melvin Goldberg, for the past four years chief of the insecticides and fungicides



Serve TEXAS CITY REFINERY *of* PAN-AMERICAN PETROLEUM *and* TRANSPORT COMPANY, *Inc.*

The fluid catalytic cracking plant alone has 13 large steam-driven compressors totalling 5450 HP. Other air and gas compressors in the refinery include electric, gas-engine and steam-driven types. This installation is an excellent example of the complete coverage of I-R process compressors. The fact that the first units were installed in 1933 when the refinery opened, is proof of their dependability and efficiency.

For refinery service specify Ingersoll-Rand reciprocating compressors, turbo blowers, centrifugal pumps and vacuum equipment.

COMPRESSORS
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OIL AND GAS ENGINES
PUMPS
CONDENSERS
AIR TOOLS
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Valuable Equipment
with
ADSCO
STRAINERS and SEPARATORS

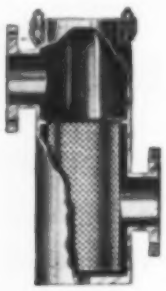
Prevent shutdowns — prolong the life of equipment—increase operating efficiency with Adsco Strainers and Separators.

THE Y TYPE STRAINER protects traps, regulators, valves and other equipment from the wearing and destructive effect of foreign matter.

THE SUCTION STRAINER does likewise for pumps and other heavier equipment where bulk liquid is contaminated with foreign matter.

ADSCO SEPARATORS
remove oil and water from steam—deliver dry steam to engines, turbines and other steam consuming equipment increasing its efficiency and protecting it from damaging water slugs.

Y TYPE STRAINER—screen held in place by removable plug that permits easy removal for cleaning—sizes from ½" to 2".



SUCTION STRAINER
Basket has handle. To clean it, simply remove cover at top and pull it out.

HORIZONTAL TYPE

VERTICAL TYPE for either up or down flow.

AMERICAN DISTRICT STEAM COMPANY
NORTH TONAWANDA, NEW YORK
Makers of UP-TO-DATE Steam Line Equipment for Over 65 Years

unit of the Chemical Bureau, WPB, has joined the Geigy Co., Inc., New York.

J. F. Vincent, formerly head of the biological laboratory of Goodyear Tire & Rubber Co., has joined the research staff of Southern Research Institute, Birmingham, Ala.

Alan B. Bell, technical director of Evans Chemicals, Ltd., is in this country for an extended visit with Evans Chemetics, Inc., of New York.

J. C. Warner

J. C. Warner, head of the department of chemistry at Carnegie Institute of Technology, has been appointed dean of graduate studies in Carnegie's College of Engineering and Science.

J. J. McCormick has been named manager of the products development laboratory of the Arco Co., Cleveland. Mr. McCormick, a chemical engineering graduate of Rose Polytechnic Institute, was previously chief chemist of the Dibble Color Co., Detroit. **Edward G. Bobalek** has been named manager of the resin research department. Dr. Bobalek was formerly a research chemist with the Dow Chemical Co.

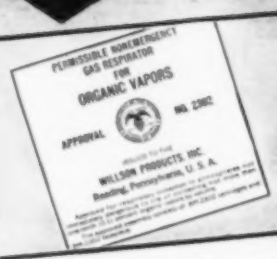
J. J. Lawler has been appointed secretary of the International Development Co., recently formed company presenting an advisory, engineering and management service for rehabilitation and modernization of foreign industry, representing various American enterprises covering the entire industrial field.

Robert D. Coghill has been appointed associate research director of Abbott Laboratories. Since 1939 Dr. Coghill has been chief of the fermentation division of Northern Regional Laboratory in Peoria.

Arthur Behr has been appointed director of aromatics research for the Dow Chemical Co. Dr. Behr will now concentrate his activities on research and assisting the trade with technical problems involving synthetic aromatics.

George W. Flanagan, formerly in charge of Geon latex development, has been made manager of the B. F. Goodrich Chemical

NOW!
Approved by
U. S. Bureau of Mines



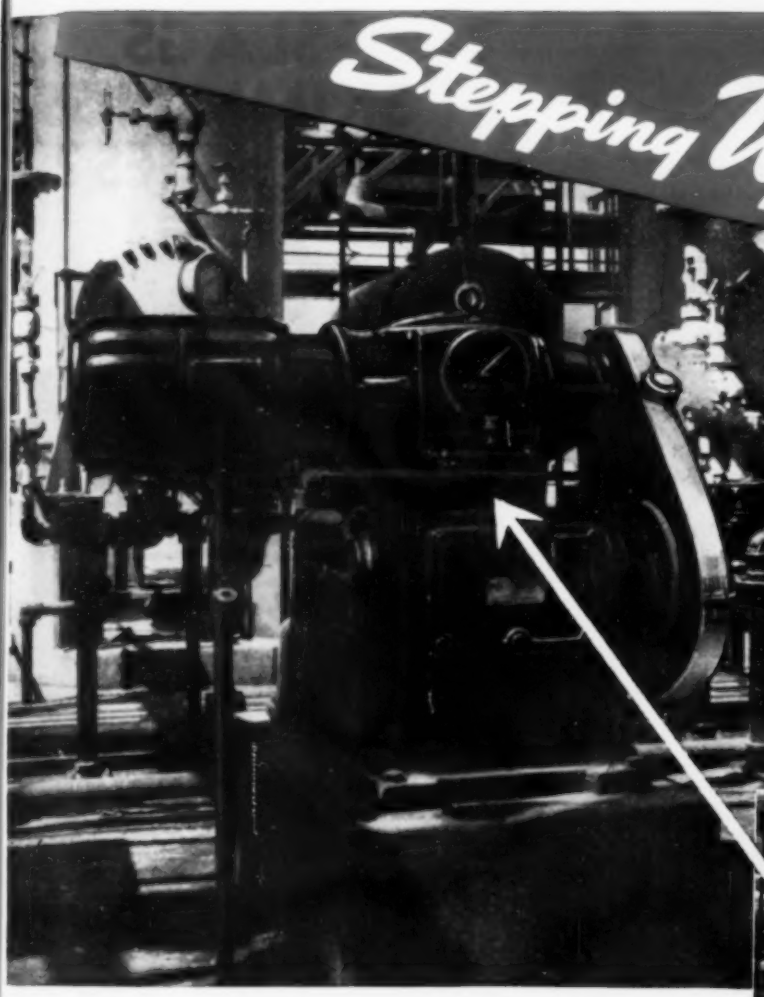
Yes, Willson's Chemical Cartridge Respirator No. 701 now has Bureau of Mines approval No. 2302. For protecting workers from *low concentrations* of commonly-encountered organic chemical vapors.

Sturdy double headband keeps respirator on tightly. Divides weight for proper balance. Two better-fit features provide extra comfort: molded rubber facepiece, adjustable nose spring.

Double filters keep breathing resistance low. Entire cartridge replaceable as a complete unit. Designed to safeguard against alcohol, benzine, carbon tetrachloride, ether, formaldehyde, gasoline, toluene.

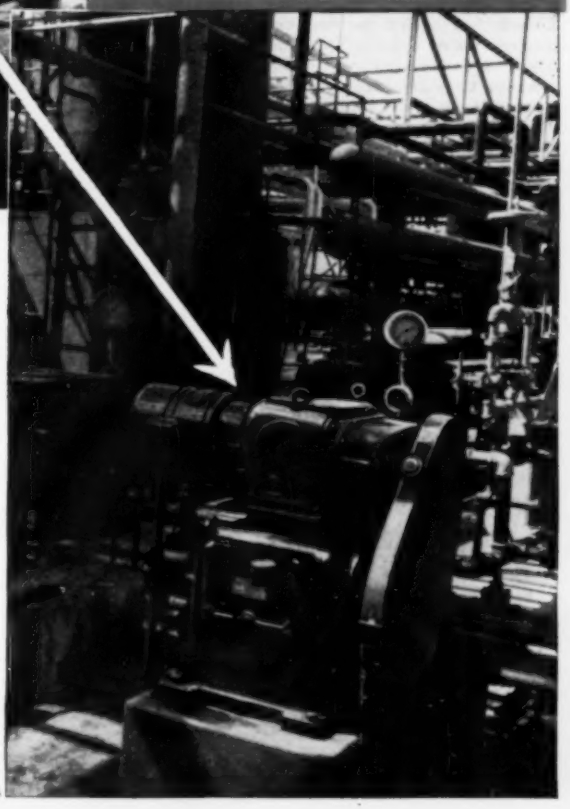
For help with your lung protection problems, get in touch with your Willson distributor or write for further information.

GOGGLES • RESPIRATORS • GAS MASKS • HELMETS
DOUBLE WILLSON
PRODUCTS INCORPORATED
READING, PA., U. S. A. Established 1870
223 WASHINGTON STREET READING, PA., U.S.A.



Stepping Up Production

OF 100-OCTANE with LINK-BELT P.I.V. GEARS



• Pictured here are two views of a Link-Belt P.I.V. Gear in a West Coast high octane plant. This unit has an important role in hastening the output of this vital fuel. Purpose of the unit here is to vary the speed of the pump to feed from 2.3 g.p.m. to 10 g.p.m. of 15-degree Baume caustic. By a simple turn of the control wheel the P.I.V. Unit positively varies speed of the pump so as to feed the required amount. Due to the infinitely variable characteristics of the P.I.V. Gear the amount of caustic feed may be varied in any amounts from maximum to minimum requirements.

The P.I.V. Gear is equipped with an explosion-proof motor and silent chain drive from output shaft to pump. Silent chain drive and entire operating mechanism of the unit are enclosed and operated in an oil bath, thus making the entire unit explosion proof.

Link-Belt P.I.V. Gears are today performing a valuable service in oil refineries and chemical plants through precision control of speeds. Send for Book No. 1874.

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LINK-BELT P.I.V. GEAR

POSITIVE INFINITELY VARIABLE SPEED CONTROL

"Centerville" Is Putting In a LAYNE WATER SYSTEM

"Centervilles" throughout the nation are rapidly graduating from town-pump villages. Their growth and stability as cities of lovely homes, fine business houses and progressive citizens has called for the installation of a modern water system. Officials of "Centerville" are beginning right—taking no chances on water supply failure—expensive operation, or short life of wells and pumps. They are putting in a Layne Well Water System. Investigation has shown "Centerville's" officials that a Layne Well Water System is easily within their means and is a sound and profitable investment.

These same kind of Layne Well Water Systems and Layne Vertical Turbine Pumps are serving the nation's largest cities—the greatest industries, biggest railroads, and the most extensive irrigation projects. Layne water producing equipment enjoys the reputation of being the world's best—and that reputation is constantly growing stronger and stronger.

Layne offers fine and always dependable Well Water System counsel with no obligation. For further facts, catalogs, etc., address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

HIGHEST EFFICIENCY

Layne Vertical Turbine Pumps are now available in sizes to produce from 40 to 16,000 gallons of water per minute. Their high efficiency saves hundreds of dollars on power cost per year.

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City • Layne-Northwest Co., Milwaukee, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Texas Co., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Western Co. of Minnesota, Minneapolis, Minn. • International Water Supply Ltd., London, Ontario, Canada • Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

Co. development laboratory in Cleveland where he will direct the activities of the laboratory technical staff engaged in materials and process development work in the company's resins, plastics and chemicals.

Lawrence Rosner, formerly chief chemist for the laboratory of Vitamin Technology in Chicago, is now in full charge of the chemical, physical and microbiological assay sections of the Nopco Vitamin Laboratories in Harrison, N. J.

Wendell F. Hess of Rensselaer Polytechnic Institute, has been elected president of the American Welding Society for the year 1945-46.

Charles E. Finney, Jr., has been elected an assistant vice president of Standard of California. At the same time **Francis H. Smith** was named general manager of the manufacturing department in charge of operations and process planning and control.

Earl W. Flosdorf has been named director of research and development for the F. J. Stokes Machine Co., Philadelphia.

John M. Martin has been appointed manager of the Pittsburgh explosives office of Hercules Powder Co. He was formerly operating manager of the Hercules-operated Sunflower Ordnance Works in Kansas.

M. G. Fontana has resigned from his position in the Technical Division of the Engineering Department, E. I. du Pont de Nemours & Co. where he has been metallurgical engineer working on development of corrosion-resistant alloys. Dr. Fontana has accepted a position as professor of metallurgy at Ohio State University. His special field of consultation will be on materials of construction and he will be consulting engineer for the Duriron Co.

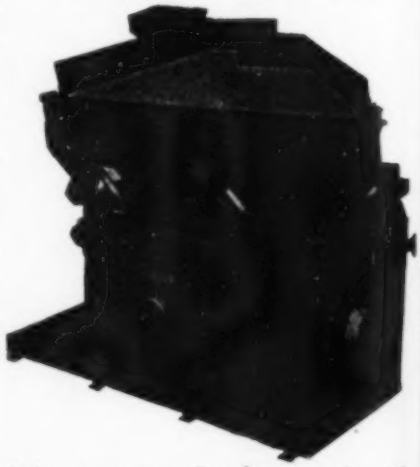
H. F. Johnstone has been named successor to Dr. D. B. Keyes as head of the chemical engineering division at the University of Illinois.

Lawton A. Burrows has been named assistant manager in charge of research, Technical Division of the Explosives Department of E. I. du Pont de Nemours. & Co Dr. Burrows succeeds **W. E. Lawson,** a former director of Eastern Laboratory, Gibbstown, N. J., who is assigned to special duty.

Robert L. Richards, who has been assistant manager of the Cellophane Division, has been appointed manager of the Nylon Division of E. I. du Pont de Nemours & Co. He succeeds **Charles A. Cary** who has been appointed assistant general manager of the Rayon Department. **Arlington Kunsman,** director of production of the Rayon Division, succeeds Mr. Richards.

LeRoy T. Barnette has been named supervisor of branch offices; **J. K. Speicher,** assistant technical service manager; and **L. C. Kleinhans,** manager of the New York

SLAGS, SKIMMINGS, RESIDUES?



Many companies have set aside material to be processed at a more convenient time. Some of these materials contain mineral values that may easily be recovered by the proper process. Many companies have installed air tables to make:

1—The most economical installation
2—The lowest cost of treatment
3—The highest recovery of values

Dry tabling will take any material between a maximum of ¾ inch and a minimum of 100 mesh (when properly graded) and improve its quality.

Our engineers will be glad to help solve your separating or concentrating problems and submit recommendations. Send sample for laboratory tests.

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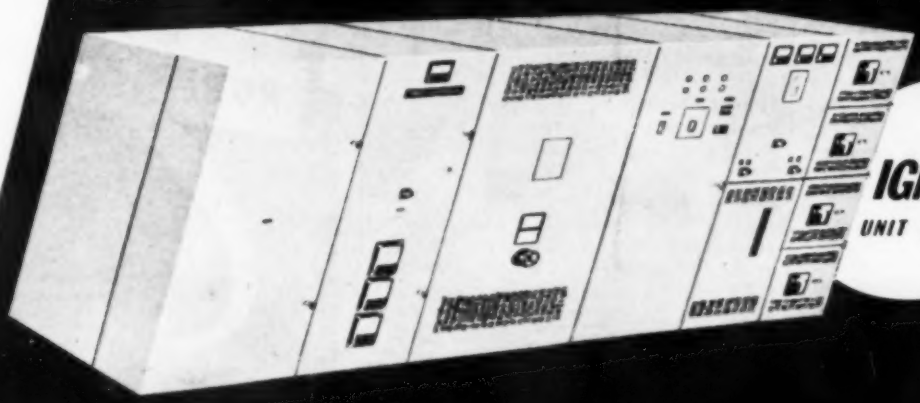
S&S
THE PROCESS FOR BETTER PRODUCTS-FASTER

Easy to install · Easier to use



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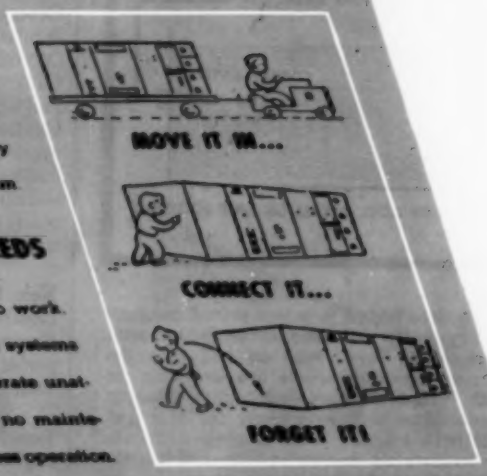
Requires LESS floor space per KW

The Westinghouse 1946 Model Ignitron Unit Substation, employing the ASL Transformer, requires less floor space per kw produced than any other conversion equipment.

The Ignitron Tubes, permanently evacuated and sealed at the factory, eliminate the need for vacuum maintaining equipment . . . thereby reduce maintenance to a minimum.



COMPACT · FLEXIBLE · MEETS ALL D-C POWER NEEDS

It's easy to install—on any reasonably level floor—even on balconies. No special foundation or reinforcing is required . . . Connect the control leads, power leads and water supply—and it's ready to go to work. No air ducts or ventilating systems are required . . . It can operate unattended, with practically no maintenance. Quiet, vibrationless operation.

CONSIDER ALL ADVANTAGES OF THIS IDEAL POWER UNIT

For efficient, economical power conversion A-C to D-C at 125 Volts or higher

- High Efficiency
- Low Maintenance
- Easy to Install
- No special foundation
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Consult Westinghouse

Call your nearest Westinghouse office or write for B-3646 "POWER CONVERSION AT ITS BEST." Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

Westinghouse Electronics at Work

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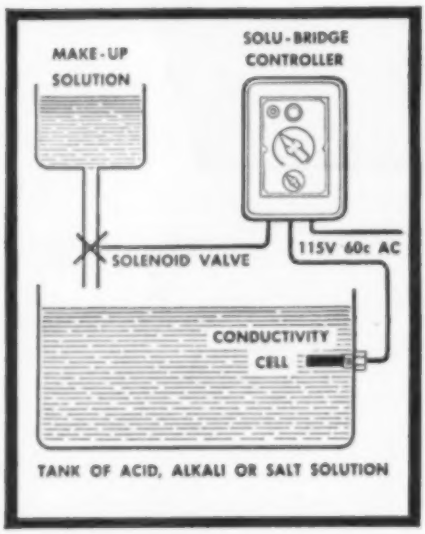
Measurement and Automatic Control of Solution Strength by Conductance

FOR ALL TYPES OF ACID AND ALKALINE BATHS FOR PICKLING, ANODIZING AND CLEANING STEEL, BRASS & ALUMINUM



The **Solu-Bridge** is a low priced compact wall-mounting AC Wheatstone Bridge with cathode-ray "eye" tube as null point indicator. Specific models are available for each type of solution—calibrated either in conductance units or directly in % of specific acid, alkali or salt. Models available for measuring concentrations as low as 0.00005% in distilled water or as high as 115% fuming sulfuric acid.

The **Solu-Bridge Controller** incorporates, in addition to all of the above features, a vacuum tube relay which operates on the unbalance of the Wheatstone Bridge and delivers up to 2 amperes at line voltage to operate a warning signal or a valve to readjust the solution concentration to any predetermined value. The instruments are in general use for measurement, detection, warning and control of:

1. Contamination and leakage into condensate lines.
2. Exhaustion of double exchanger units.
3. Completeness of rinsing and washing.

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WRITE FOR BULLETINS

Industrial Instruments

PLANT and OFFICES:
17 POLLACK AVENUE
JERSEY CITY 5, N. J.

office for the Cellulose Products Department of Hercules Powder Co.

John M. Clark, assistant production superintendent of the Chambers Works of the DuPont Co., Deepwater, N. J., has been appointed to the newly created position of general superintendent of the Photo Products Department with headquarters in Wilmington.

Hunter Nicholson has been appointed manager of the Los Angeles factory of Kelite Products, Inc.

Paul F. Kohlhaas has recently been appointed to fill the newly created position of vice president in charge of engineering at the Columbia Steel Co., San Francisco, Calif. Mr. Kohlhaas has been chief engineer of Columbia Steel Co. since 1941.

Gerald F. Alcorn has been named manager of the Everett, Wash., mill of the Pulp Division of Weyerhaeuser Timber Co. Mr. Alcorn, a graduate in chemical engineering from the University of Washington, has been plant engineer at the Everett mill for the past 5 years.

George L. Parkhurst has recently been appointed a vice president and director of Oronite Chemical Co., San Francisco, Calif. Together with these duties Mr. Parkhurst will serve as a director of the California Research Corp. Both of these firms are subsidiaries of Standard Oil of California. Mr. Parkhurst was formerly affiliated with Standard Oil of Indiana and more recently with the Petroleum Administration for War in Washington, D. C.

Nels E. Swanson recently resigned from Goodyear Tire & Rubber Corp., Rubber Reserve Div., to become instruments engineer with the Foxboro Co., Los Angeles branch.

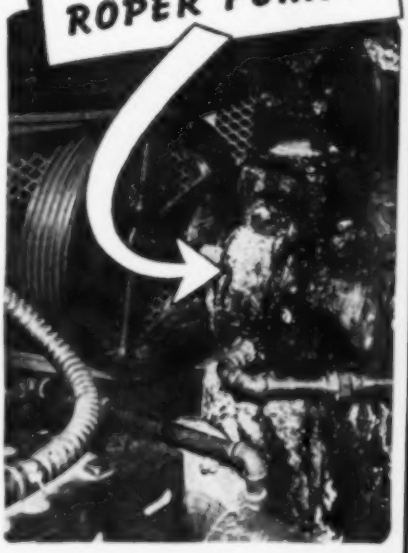
James M. Hait has been named director of engineering for the Food Machinery Corp. of San Jose, Calif. Becoming chief engineer of the Peerless Pump Co. in 1930, Mr. Hait remained in that capacity until 1942 when he was made manager of the procurement and engineering division of Food Machinery Corp. in Los Angeles. At the same time, it was announced that **William DeBack** was named manager of the Anderson-Barngrover division, with headquarters in San Jose.

William W. Robinson, Jr. has been named chief chemist of the new technical service and research laboratory of the Pacific Coast Division of the Texas Co.

Otho Behr, inventor of the Behr process for polymerization and fractionation of drying and semi-drying oils, has been elected vice president of California Flaxseed Products Co., Los Angeles, Calif.

E. B. Gunyou has been appointed assistant to the manager of the Research and Development Department of Pennsylvania Salt Mfg. Co., Philadelphia. Dr. Gunyou was formerly with Production Division, U. S. Army Service Forces and liaison officer to Chemicals Bureau, WPB. Prior to

HANDLING A HOT AND HEAVY JOB FOR 20 YEARS with ROPER PUMPS!



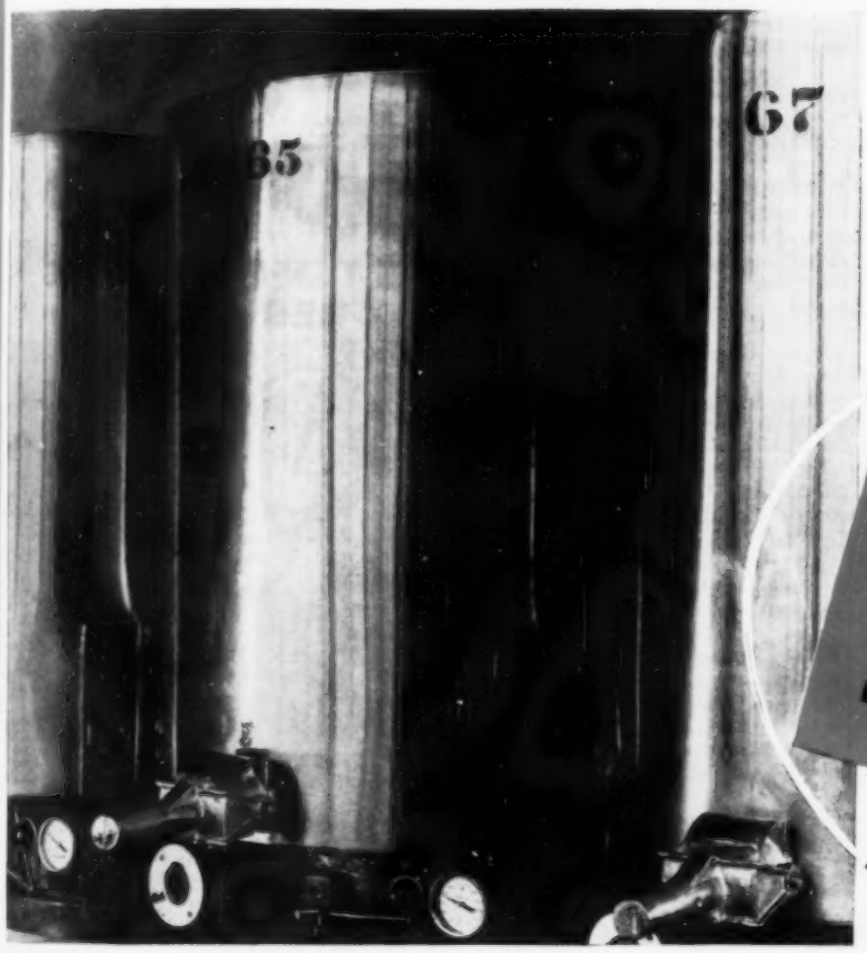
The job of pumping hot and heavy liquids is no pushover . . . it's about as tough as they come . . . yet the Roper illustrated above has been in continuous service for over 20 years. . . This pump, and 7 others like it, are pumping asphalt at 500° temperature and hot oil at 600°, 24 hours a day, 6 or 7 days a week at the Weaver-Wall Company plant, Cleveland, Ohio. Their report is, "Service amazingly satisfactory at remarkably low maintenance cost".

ROPERS ARE ENGINEERED TO FIT INDIVIDUALIZED REQUIREMENTS 13 Sizes... 3 Series... Standard drives and mountings to fit every job. Capacities 1 to 300 g.p.m., pressures up to 1000 lbs. p.s.i. Service offices in principal cities. Ask for facts about Free Engineering Service.

WRITE FOR BOOKLET **"How To Solve Pumping Problems" and Catalog No. 11-41.**

GEO. D. ROPER CORPORATION, ROCKFORD, ILL.

ROPER Rotary Pumps



Widely varied are the applications for Republic ENDURO Stainless Steel in the processing industries. These gelatin tanks are but one example. Other applications include: mixers, kettles, evaporators, condensers, filters, valves, tubing and drums.

Enduro Pays in many ways

A smooth, sanitary surface—free from tiny pores which carry contaminating materials between batches—is an inherent quality of long-lasting Republic ENDURO Stainless Steel.

Moreover, ENDURO does not contaminate metallically . . . has no effect upon quality or purity of most chemical or pharmaceutical products, and is not affected by them.

ENDURO is easy to keep clean, too. With warm soapy water, sticky or greasy substances come off quickly with a minimum of effort. And no matter how many times it is cleaned, ENDURO retains its hard, lustrous surface—because it is solid stainless steel all the way through.

For further information about these and other money-saving reasons for using Republic ENDURO Stainless Steel, write *today* to:

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Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

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ENDURO STAINLESS STEEL
Reg. U. S. Pat. Off.

Other Republic Products include Carbon and Alloy Steels—Pipe, Sheets, Strip, Plates, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

AT YOUR FINGER TIPS

ALL THE INFORMATION ON THIS TERRITORY

And you'll want this information, before you decide where to move or expand your business. You'll want to know all about the fastest-growing industrial section in the country—the West and Southwest.

You'll find the easiest, quickest way to get such information is to consult the Missouri Pacific Industrial Development Department. On the staff of this Department and its Research Bureau are specialists who can help you. These men can give you the *facts*—facts about raw materials, electric power, water, natural gas, labor supply, accessibility to markets... and all facts and figures you need regarding opportunities for the growth of your business in our territory.

Write or wire Industrial Development Department, 1706 Missouri Pacific Building, St. Louis 3, Missouri; or Industrial Development Department, Missouri Pacific Lines, Union Station, Houston, Texas. Your inquiry you may be sure, will of course be treated in the strictest confidence.

MISSOURI PACIFIC LINES

NOW MORE THAN EVER
"A SERVICE INSTITUTION"

his army service, he was development engineer for the Grasselli Chemicals Department of Du Pont.

Fred C. Abbott has been made manager of the New Products Division of Pennsylvania Salt Mfg. Co., Philadelphia.

William R. Ellis and **Mahlon G. Milliken** have been elected vice presidents of Hercules Powder Co. Mr. Ellis has been general manager of the Explosives Department and Mr. Milliken, general manager of the Cellulose Products Department.

Turner Alfrey, research chemist of the Monsanto Chemical Co., has joined the staff of the Highpolymer Research Bureau at the Polytechnic Institute of Brooklyn to teach specialized courses.

M. M. Keim, for the past three years industrial specialist with the Chemicals Bureau of WPB, has joined the staff of The American Potash Institute, Washington, where he will be in charge of its economic and statistical department.

R. M. Deanesley, recently with M. W. Kellogg Co. and Kellex Corp., has joined the research staff of Universal Oil Products Co. where he will be in charge of a new department in the company's Riverside laboratories.

Oscar F. Hedenburg of Mellon Institute has been elected chairman of the Western Pennsylvania Chapter of the American Institute of Chemists.

A. Cohen, a chemical engineering graduate of MIT with a L.L.B. degree from National University Law School, has been appointed counsel for the Chemical Department of the General Electric Co.

OBITUARIES

Walter Goodman Bouche, 70, manager of the special brands department of Procter & Gamble, died October 8.

John X. Farrar, 56, assistant secretary and advertising manager of the Jeffrey Mfg. Co., died in Columbus, Ohio, October 11.

D. F. J. Lynch, director of the U. S. Department of Agriculture's Southern Regional Research Laboratory in New Orleans since its establishment in 1938, died in New Orleans October 15.

Henry A. Goman, founder and president of the Natural Products Refining Co. of Jersey City, died in Old Westbury, L. I., October 16.

Semour Dewey, 52, president of the Tee Off Co., manufacturing chemists, died in Cleveland Heights October 28.

Eugene C. Bingham, 67, a pioneer in rheology and former head of the department of chemistry at Lafayette College, died in Easton, Pa., November 6.

Frederic E. Twining, 71, owner of the Twining Laboratories in Fresno, Calif., died recently.

Economize WITH POWERS

TEMPERATURE REGULATORS

Use a Powers No. 11 Temperature Indicating Regulator when you want the advantages of an easy-to-read dial thermometer combined with a dependable self-operating regulator. The dial thermometer gives a visual check on the performance of the regulator and makes it easy to adjust for the required operating temperature. Various dials and ranges are available.

Is Easy To Install—because both the thermometer and the regulator operate from the same thermal system—only one tapped opening is required.

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2727 Greenview Avenue, Chicago 14, Illinois
231 E. 46th St., New York 17, N. Y.—Offices in 47 Cities... See your phone directory.
70

OVER 50 YEARS
OF AUTOMATIC TEMPERATURE AND HUMIDITY CONTROL

How fast-acting LIMITAMP CONTROL protects high-voltage motors

TYPE EJ-2 FUSES CLEAR FAULT CURRENTS IN ½ CYCLE

● Limitamp control, with its current-limiting EJ-2 fuses, provides *fast, positive* short-circuit protection for high-voltage squirrel-cage, synchronous, and wound-rotor motors.

When a short circuit occurs, the fuses cut off the rise in current in less than a quarter cycle, and clear the short in less than a half cycle—long before the short-circuit current has time to harm the contactors or motor.

Gives This Lumber Mill Sure, Short-circuit Protection

New Limitamp controls at the Hammond plant are inspected by Lloyd Snook, chief electrician. This factory-assembled group control saves installation time and space as well as materials.

For the newest "packaged" control to protect high-voltage motors, the Hammond Lumber Company of Eureka, Cal., chose fast-acting *Limitamp control.*

Incoming power for the mill is taken directly from the generator bus of a nearby generating station. Therefore, power under short-circuit conditions may run as high as 150,000 kva, making a high degree of protection essential.

Limitamp control, with its current-limiting fuses, provides this protection for all motors in the plant.

INDUSTRIAL CONTROL

Keep on buying BONDS—and keep all you buy

Other Advantages Limitamp Control Offers YOU

1. *New air-break contactors* meet the most severe requirements of high-voltage motor-control service.
2. *Efficient overload relays,* accurately calibrated against actual motor characteristics, protect your motors from overheating.
3. *Undervoltage protection*—when power fails or voltage is low, the motor is taken off the line and will not restart on return of power.
4. *Silent operation*—EJ-2 fuses are noiseless when they blow.

NEED MORE INFORMATION? Bulletin GEA-4247 gives a complete, illustrated description of Limitamp control. For a copy, contact our local office. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

HAVE YOU HEARD HOW THIS MILL CAN HELP YOU?

FINER GRINDING, MORE UNIFORM DISPERSIONS RESULT IN BETTER PRODUCTS

The Eppenbach *High Speed Wet Grinding and Colloid Mill* is a dual purpose machine:

1 It reduces particles to sub-micro-dimensions by grinding, and

2 Effects perfect dispersion of such particles into fluid or plastic materials.

An examination of the turbine design shows why it is possible for a single machine to perform these two distinct operations. Liquid is broken up into minute globules by high velocity impact at top of turbine. Suspended material is mechanically sheared by the rotor and stator teeth, and hydraulically sheared by the final smooth surfaces of rotor and stator.

Eppenbach Mills are available in laboratory and production sizes. Capacities range from ½ to 3600 gallons per hour or higher.

Write for complete details. Ask for a copy of Catalog No. 401.

EPPENBACH, INC.
44-04 11th STREET
LONG ISLAND CITY 1, N. Y.

Eppenbach
PROCESSING EQUIPMENT FOR OVER 50 YEARS

INDUSTRIAL NOTES

International Minerals & Chemical Corp., Chicago, announces that George W. Moyers, recently discharged from the Navy with the rank of commander, has resumed his duties as sales manager of the phosphate division.

General Printing Ink Corp., New York, has added George W. Naylor to its staff. He had been with the Production Division, Army Service Forces, with the rank of lieutenant-colonel.

Foote Mineral Co., Philadelphia, has removed its entire offices to 12 East Chelten Ave., Philadelphia, 44.

Strong, Carlisle & Hammond Co., Cleveland, is now represented in Dallas by Harry E. Clark & Co. who also are distributors for the company in Houston.

Wyandotte Chemicals Corp., Wyandotte, Mich., has transferred Dr. Roy E. Heath from the market research staff to head the industrial sales department of the J. B. Ford division. He is associated with W. M. Cole former head of the department who is retaining his connection with the company for an indefinite period.

Container Corp. of America, Chicago, has added Walter C. Granville as color technologist to the staff of its color laboratories division.

The Lincoln Electric Co., Cleveland, has elected H. F. Kneen vice president in charge of manufacturing and G. G. Landis vice president in charge of engineering.

Bechtel Brothers McCone Co., San Francisco, is the title of a new corporation engaging in engineering and construction. W. E. Waste is president, J. P. Yates and Van W. Rosendahl, executive vice presidents and Jerome K. Doolan and V. G. Hindmarsh vice presidents.

Tanner Chemical Co., Ferndale, Mich., has elected James Barry vice president and treasurer in charge of sales.

Cochrane Corp., Philadelphia, has been acquired by a group long associated with the company in the engineering and sales divisions. T. E. McBride is president and the following are vice presidents: C. E. Joos, apparatus division, V. A. Rohlin, works manager, A. E. Kittredge, chief engineer, and E. S. Daugherty, heater division.

United States Rubber Co., New York, has assigned Stephen H. Tyng to the technical sales organization with headquarters at 560 Atlantic Ave., Boston. Mr. Tyng had been located at the synthetic rubber plant operated by the company at Institute, W. Va.

Robins Conveyors, Inc., Passaic, N. J., on November 1 opened an office in the Brown-Marx Bldg., Birmingham, Ala., under the direction of Charles A. Thompson who, prior to the war, served the company as sales engineer in the Pittsburgh office.

American Cyanamid Co., New York, has appointed H. Walton Arrowsmith district sales manager of the fertilizer division to direct fertilizer activities in the West Coast area. His headquarters are in the Russ Bldg., San Francisco.

TruTest Laboratories, Inc., Philadelphia, has appointed Roberts-Konrad, Inc., 90 West St., New York, as sales engineers and consultants on water testing problems.

Ketotest Mfg. Co., Pittsburgh, again has H. E. Ferrill as sales and development engineer of the brass division after an absence of four and one-half years with the armed forces.

Allis-Chalmers Mfg. Co., Milwaukee, has made R. N. Landreth assistant to W. C. Johnson, vice president of the general machinery division. Mr. Landreth has been acting as special representative of the company in Washington, D. C., and will continue to make his headquarters in that city.

Tube Turns, Inc., Louisville, announces that Fred C. Smith, who joined the company in 1943 as chief metallurgist, has been appointed to the position of director of quality.

Bright Light Reflector Co., Brooklyn, N. Y., is transferring all its activities to the plant which it recently acquired in Bridgeport, Conn.

Hewitt Rubber Corp., Buffalo, and its subsidiary, Robins Conveyers, Inc., have opened an office in Charleston, W. Va. The new office is headquarters for R. L. Jackson of the Robins division and Nelson J. Reinhold who recently came to Hewitt from the Cincinnati Rubber Co.

Gunn, Carle & Co., San Francisco 3, Calif., distributors of industrial supplies and building materials, has been appointed California agents and distributors of protective plastic coatings produced by Plastic Lining Corp., Chicago, Ill.

J. F. Geary, consulting engineer, has opened an office for design of plants and equipment for the process industries at 704 South Spring St., Los Angeles 14, Calif.

United States Stoneware Co., Akron, announces the acquisition of the plant, processes, equipment and personnel of Plastic Spray Corp., 927 N. Sycamore St., Hollywood, Calif. The new division will now operate under the name of Western Process Equipment Co. J. A. Maher of the Los Angeles branch of U. S. Stoneware Co. has been named vice president and general manager of the new division.

Oliver United Filters, Inc., Oakland, Calif., announces that Gordon M. Girdwood has been transferred from the Chi-

Still holding below-zero temperatures efficiently

AFTER 33 YEARS OF SERVICE...

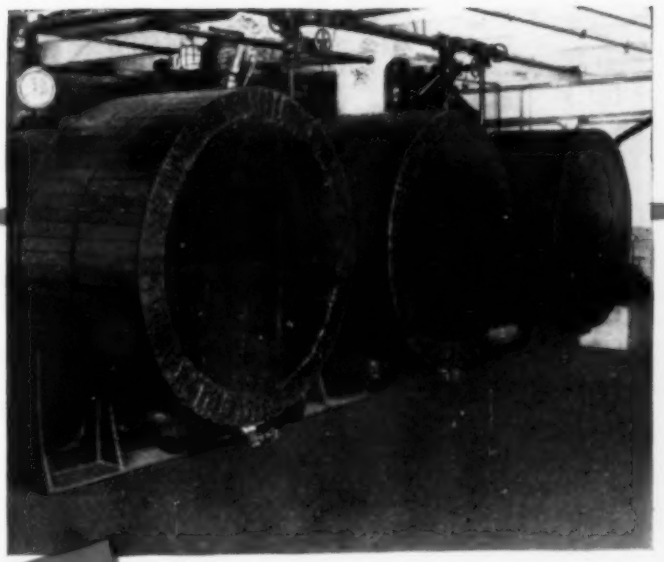
RECORDS FOR LONG SERVICE are easy enough to establish when conditions are moderate. But materials really prove their worth when the going is tough.

In Memphis, Tenn., 6" of Armstrong's Cork Lagging has held temperatures in two shell and tube brine coolers down below −12° F. for 33 years—in a third cooler for 28 years. Despite the wide temperature differential inside and outside these tanks, that lagging is still insulating efficiently. According to Mr. Charles A. Conley, chief engineer of the plant, the only maintenance has been occasional inspection of bands and periodic repainting.

Impressive savings result from service like this. Refrigeration losses are kept down—day in, day out, year after year. Repairs and replacements are minimized. "Downtime" is greatly reduced.

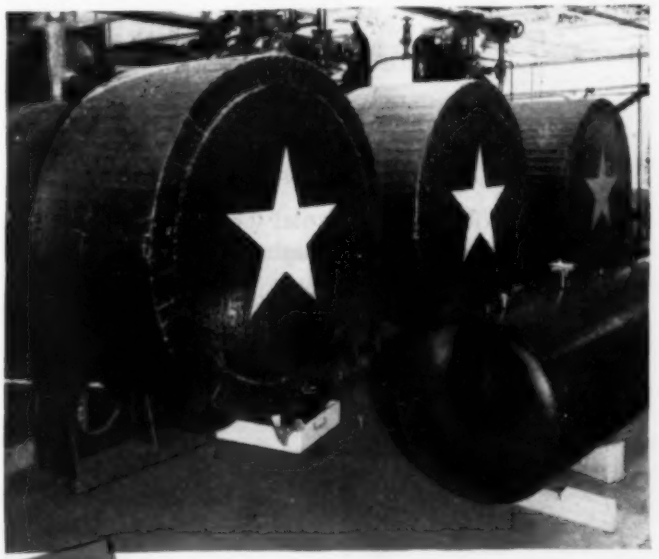
Long dependable service can be expected from Armstrong's Cork Lagging and Armstrong's Cork Covering, even under the severe conditions encountered in the process industries. That's because of the inherent durability of cork and its high natural resistance to moisture. This material has exceptionally low thermal conductivity. It is fire resistant and light in weight. Structurally strong and rigid, Armstrong's Lagging and Pipe Covering fit tightly against all surfaces, leave no pockets where frost can accumulate.

For full information, write today to Armstrong Cork Company, Building Materials Division, 3311 Concord Street, Lancaster, Penna.



1912

Armstrong's Cork Lagging installed on two 12° below zero shell and brine coolers at the Memphis Cold Storage Warehouse Company. In 1917, when this view was taken, lagging was installed on third tank.



1945

The same three coolers, two now 33 years old, have the original Armstrong's Cork Lagging on them. And the lagging is still efficiently holding the sub-zero temperatures inside.

ARMSTRONG'S INDUSTRIAL INSULATION

Complete Contract Service For All Temperatures

From 300° Below Zero

To 2600° Fahrenheit

DEPENDABLE
TEMPERATURE READINGS
AS HIGH AS 1000°F

WESTON *All Metal* THERMOMETERS

are stable and rugged over wide temperature ranges

Here are advantages of Weston All-Metal Industrial Thermometers that provide long-term dependability for Diesel engine applications and for industrial heat control.

- WESTON all-metal temperature element has proved its stability throughout the years.
- Rugged all-metal construction resists vibration, shock and other mechanical abuse.
- Large gauge-type scales permit accurate readings even from a distance.

Weston All-Metal Industrial Thermometers are available in types and sizes for most applications, with stem lengths from 2½" to 48". Ranges + 1000° F to − 100° F. Literature sent on request . . . Weston Electrical Instrument Corporation, 590 Frelinghuysen Avenue, Newark 5, New Jersey.

Weston *All Metal* **THERMOMETERS**

cago office to fill the newly created position of engineering field representative, with headquarters in the Oakland general offices.

Colorado Fuel & Iron Works, Denver, announces that K. B. Stuart has been made manager of sales in the chemical division. Mr. Stuart will have his headquarters in Denver.

Monsanto Chemical Co., St. Louis, has appointed S. U. Shorey as assistant manager of plasticizers and resins sales and B. B. Langton as assistant manager of intermediate sales. Both will report to C. H. Sommer, St. Louis.

The Glidden Co., Cleveland, has named George H. Tulley assistant sales manager of the Metals Refining Co. division with headquarters at Hammond, Ind.

Hercules Powder Co., Wilmington, has announced the appointment of LeRoy Keane as director of sales of the explosives department to succeed C. C. Gerow who had held that position since 1919.

Lukens Steel Co., Coatesville, Pa., has made Arthur H. Brown manager of sales for Pittsburgh and vicinity for the parent company and its subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

B. F. Goodrich Chemical Co., Cleveland, has placed Wayne Brinkerhoff in charge of advertising and sales promotion for all the products of the company. Formerly he was manager of technical service data.

John I. Thompson & Co., Washington, D. C., has moved to new executive and engineering offices at 921 17th St., N. W. Robert E. Worden has joined the organization as partner in charge of management services.

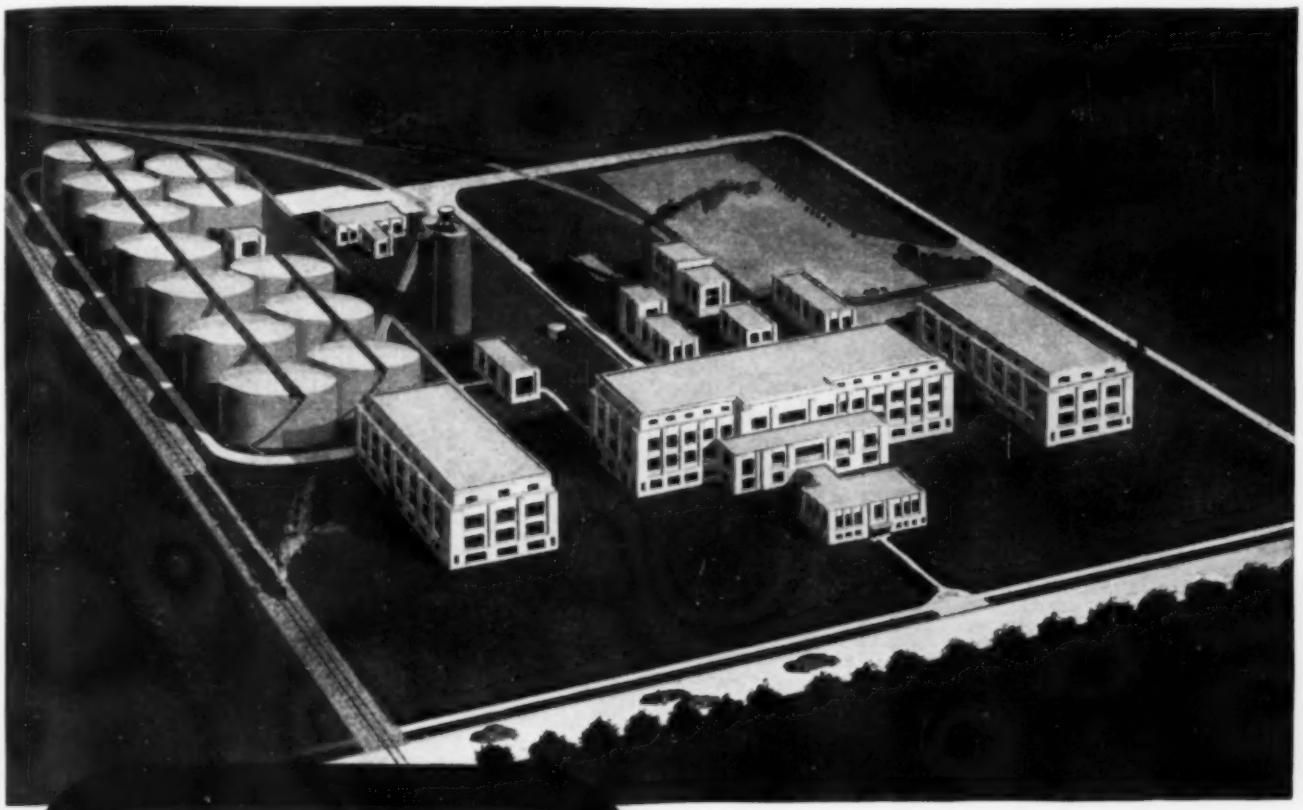
Proctor & Schwartz, Inc., Philadelphia, has opened a branch office in the Wilder Bldg., Charlotte, N. C. John R. Schenck, recently discharged from the Army with the rank of major, is in charge of the office.

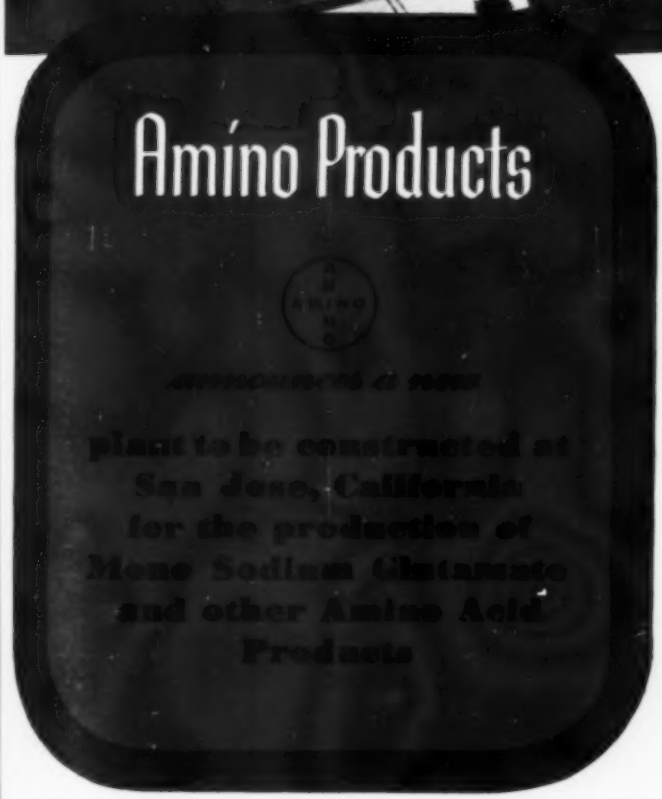
The Westinghouse Electric Corp., Pittsburgh, has purchased from Talon, Inc., property in Meadville, Pa., consisting of more than five acres and five major buildings. The entire Westinghouse line of industrial heating equipment will be produced in Meadville.

Gotham Instrument Co., New York, has placed David Kahn in charge of advertising, public relations and sales promotion of its newly formed advertising department.

Baker Instrument Co., Orange, N. J., has been formed by Frank C. Baker, Jr., who formerly was service and sales manager of the Scientific Glass Apparatus Co.

Pittsburgh Equitable Meter Co.-Merco Nordstrom Valve Co., Pittsburgh, has added Waldo S. Hull to its sales staff. He will make his headquarters in Philadelphia and handle sales in the Philadelphia and Washington areas.





Glutamic Acid, Glutamic Acid Hydrochloride, Betaine Hydrochloride, and other Amino Acids and Protein Derivatives will also be produced at both the San Jose, California, and the Rossford, Ohio, plants for food and pharmaceutical purposes.

To meet the rapidly growing requirements of quality food processors for Mono Sodium Glutamate, International Minerals & Chemical Corporation is building a new plant at San Jose, California, to supplement production at its Rossford, Ohio, plant.

The new San Jose plant will be in production in 1946. It will be completely modern in design and construction, with every facility to utilize the technological "know-how" gained by years of research and production experience.

Mono Sodium Glutamate is the salt of one of the Amino Acids, a pure vegetable food product produced from the hydrolysis of wheat or sugar-beet proteins. It is well known among epicures, in this country and the Orient, for its unique quality of enhancing the subtle and delicate flavors of fine foods.

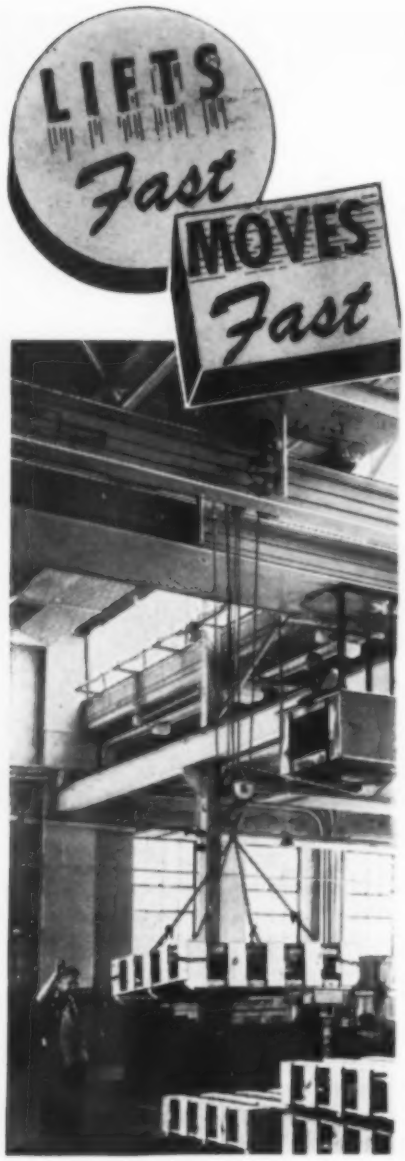
Rapid progress has been made in recent years by American food technologists in the development of new uses for Mono Sodium Glutamate to satisfy discriminating consumers' outstanding preference for quality foods.

Amino Products looks forward eagerly to the time when greatly expanded production of Mono Sodium Glutamate, at the San Jose and Rossford plants, will make possible its extensive use by America's leading food processors to give millions of people new pleasure and delight in their enjoyment of fine foods.

Amino Products

Food and Pharmaceutical Division

International MINERALS & CHEMICAL CORPORATION • GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6



Here is a Reading Crane that solved a warehouse problem in the rapid handling of materials awaiting shipment.

The crane was engineered to the needs of the job—span, lift, crane drive, trolley drive, hoisting speed—from standard Reading Crane units at no extra cost. The Reading Crane unit design can save money for you in your materials handling problems. You get an engineered solution to your electric crane problem at no extra cost.

For full information, write for the Reading Crane Catalog.

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OVERHEAD TRAVELING CRANES

READING CRANES

CONVENTION PAPER ABSTRACTS

CONTENTS

Rubber-Lined Equipment 256
Science and Business..... 256
Pacific Aluminum 258
Licensing the Chemist..... 260
Western Magnesium's Future.... 262
Postwar Building 264
Consultants' Charges 266
Mechanism of Solvent Action.... 266
Expert Witnesses 268
Current Chemical Statistics..... 270
Postwar Aluminum 272
Atomic Energy Utilization..... 278

RUBBER LINED AND RUBBER COVERED EQUIPMENT

Since Nov. 1, 1943, the rubber linings used in tanks, pipe, drums, etc., have been limited to general purpose synthetic of which 95 percent or more has been GR-S, and the small balance GR-M and GR-I. In the linings now used, we are permitted to use 10 percent natural crude rubber by volume, and for tank cars which must meet ICC specifications, 35 percent is allowed. Out of the 10 percent crude rubber by volume must also come the rubber that is needed for repairing existing rubber-lined equipment, and for the necessary bonding cements. Some rubber-lined equipment is now quite old, and from time to time, often due to physical abuse, repairs must be made.

We are today lining nearly all types of equipment with synthetic compounds, that up to date appear to be doing a job comparable to natural crude rubber recipes previously used. It can be said in general that synthetic rubber linings tend to slightly discolor certain chemicals to a higher degree that did natural rubber compounds, but fortunately in many applications this is not important, and has caused very little concern. On the other hand, certain synthetic rubber linings have been developed that discolor acids less than did natural crude rubber materials.

The largest volume of rubber-lined equipment is sold for handling muriatic acid. It was the thought of many people using rubber-lined equipment that GR-S general purpose synthetic rubber was not satisfactory for this acid. This is generally true as far as soft compounds of GR-S are concerned, but GR-S can be made in flexible, hard and ebonite types, and the resistance of such grades to muriatic acid is comparable to similar hardnesses made of natural crude rubber.

Weak solutions of sulphuric acid as used for pickling or cleaning before electroplating, offer no particular problem as even soft GR-S grades handle them satisfactorily.

When natural crude rubber again becomes available, it will be the most prevalently used lining because it is easier to handle and install than linings made from synthetics. It requires considerably more time to install the synthetic materials in view of the fact that they lack natural building tack and often require pre-shrinking before they are applied to the vessel to be lined.

Thermoplastic linings such as Koroseal are applied directly to the steel walls of the containers by using proper adhesives but it is not required to vulcanize the lining after it has been adhered to the container. Before the war these materials were strictly special purpose linings and were only used where rubber linings would not handle the corrosives involved such as oxidizing acid solutions, for example, nitric and chromic.

The cost of these linings is higher than natural crude rubber or general purpose synthetic rubber linings, but there are a sufficient number of successful installations, especially in electroplating where some electroplaters prefer this type of lining for future installations.

H. C. Klein, B. F. Goodrich Co., before Cleveland Section of The Electrochemical Society, Cleveland, Sept. 22, 1945.

WARTIME SCIENCE AND POSTWAR BUSINESS

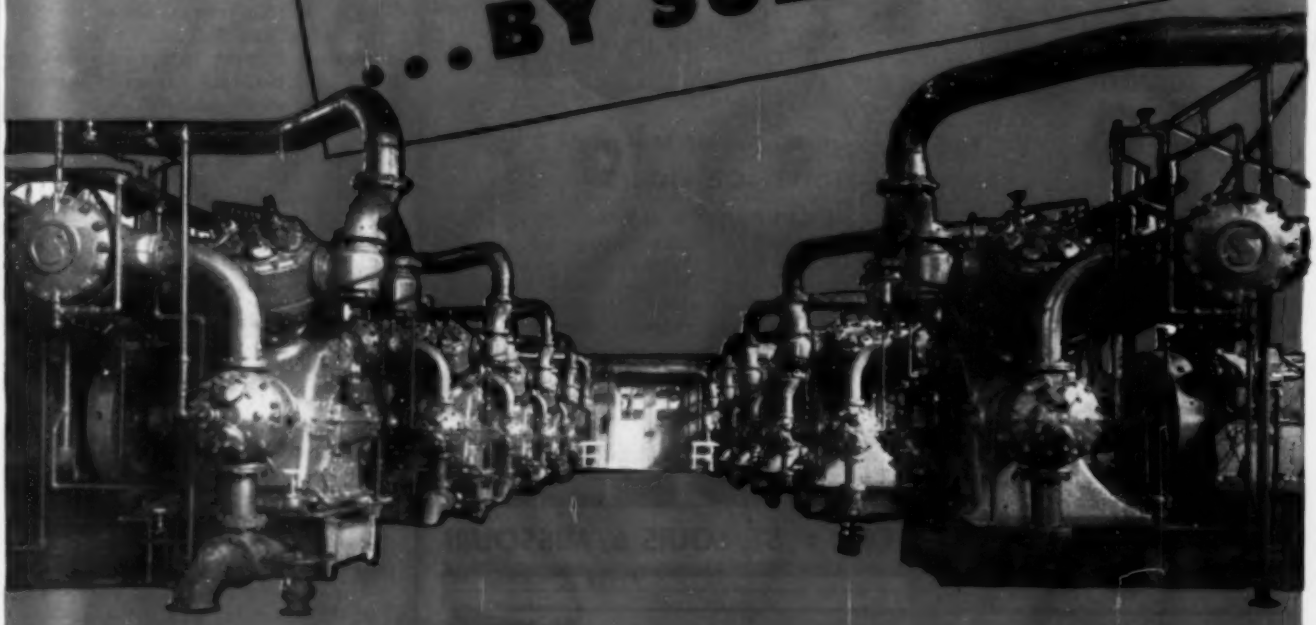
War always demands power and ever more power. The only source of more power is more knowledge and the only source of more knowledge is scientific research. Thus in the past five years we have seen a tremendous upsurge of science in this country and a very gratifying increase in popular interest in scientific matters. Many thousands of people who formerly brushed aside any mention of science are now eager to learn all about it.

Especially at the moment, everyone wants to know the consequences of the atomic bomb and of atomic power. It is impossible to overestimate the consequences of atomic power, but it is easily possible to get excited about them too soon. Atomic power has no meaning at present, aside from its military and political value. It cannot be controlled, and it is too expensive. We have already spent two billion dollars and five years of research on its destructive use, and my guess is that we shall have to spend the same amount of money and time to make it useful in constructive industry.

First of all, the explosion rate must be slowed down. The situation is the same as it was in the '90s with regard to gasoline which then was a terrific explosion hazard for the petroleum industry. It was harnessed by the invention of the internal combustion engine which utilized the explosions drop by drop. When this is done for atomic power, there still remains the problem of making it cheap.

Advances of wartime medicine should not be overlooked. The use of blood plasma, of the sulfa drugs, and of penicillin has saved the lives of 60,000 wounded men who would have died if medical science had learned nothing since the first World War. These advances in medicine are now available to civilians and they will have one tremendous consequence. The balance sheet of the medical profession is kept by the insurance companies and the profit is expressed in terms of "life ex-

AIR POWER
...BY SULLIVAN



A recognized leader in the air compressor industry, Sullivan has pioneered in the development of all types of air power. Sound engineering design, better materials and finer workmanship have produced air equipment which most of the prominent industrial firms in America have selected . . . a tribute to Sullivan dependability, economy and efficiency. Sullivan gives you air compressor superiority that comes from over 94 years experience with air power problems all over the world. If the job is done with air . . . you can do it better with Sullivan Air Equipment. Sullivan Machinery Co., General Offices: Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

AIR COMPRESSORS FROM ¼ TO 3,000 H.P.

SULLIVAN

PRODUCTS

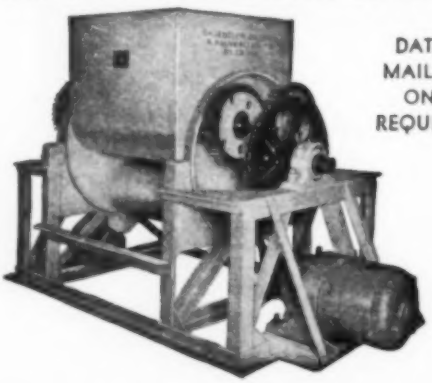
Stationary and portable air compressors from ¼ to 3,000 H.P., pneumatic casting grips, foundation breakers, portable hoists, rock drills.

OFFICES { Seattle, Boston, New York, Chicago, Portland, Pittsburgh, St. Louis, Detroit, San Francisco, Birmingham, Knoxville, Huntington, Los Angeles, Duluth, El Paso, Butte, Salt Lake City, Scranton, Denver, Dallas

GRUENDLER CRAFTSMANSHIP SERVING INDUSTRY 60 YEARS

GRUENDLER BATCH MIXERS

Built in Sizes From
50 POUND BATCH
TO 4 TON BATCH
CAPACITIES



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DRY—MOIST—OR LIQUID

The specially designed GRUENDLER *DOUBLE SPIRAL AGITATORS* assures thorough, complete mixing of . . . Chemical Products. Construction features include massive bearing supports, effective power transmission and special liners of corrosion resisting materials. Stainless Steel, Nickle and Monel Metal Liners are frequently specified.

Consult a Gruendler Engineer for Your Work

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CRUSHER and PULVERIZER CO. • ST. LOUIS 6, MISSOURI

An answer to many extreme thermal, chemical and electrical conditions

Amersil

(TRADE NAME REGISTERED)

The inherent physical properties of Amersil (American Silica) articles meet practically all conditions where extreme thermal, chemical and electrical conditions are encountered.

Write today for the new Amersil book describing these properties and showing a variety of Amersil articles now in use in laboratories, chemical, metallurgical and industrial plants.

AMERSIL COMPANY Inc.

CHESTNUT AVENUE ENGELHARD HILLSIDE 5, N. J.

pectancy." This has grown steadily. Now authorities agree that the advances of wartime medicine will add another ten years, so that future babies will, on the average, live to be 75 years old.

These are only examples to show that when we have solved the problems of reconversion from war industry to peace industry, there will still be great changes ahead. The Committee for Economic Development has done a superb job in planning for this reconversion and in organizing all parts of American industry and commerce for the day that is now here, the day of reconversion. Now the Committee must face the further problem of stimulating industry to keep up with the times—and that means times of change.

Life has always changed under the impact of science. We spend our dollars and our days in ways that our grandfathers could not dream of, and we do so because of past science. Wartime science will produce even greater changes and they will come much faster. Every industry must keep its eyes on the birthplace of the future—the scientific research laboratory.

Production is not the problem. What we have done in war production can be equalled in peace production. The real difference is that now, instead of having only one customer, we shall have many customers. And the real question is whether the many customers that comprise the United States can have as much purchasing power as the single customer who is also the United States. In other words, the real question is whether purchasing power will be maintained.

The only obstacle is lack of confidence. The difference between a rising spiral of production and distribution and a descending spiral is confidence. If confidence goes, our economy will shrink. That is the great service of the Committee for Economic Development. It has done its job well in that American business men are confident and on the whole working men are too.

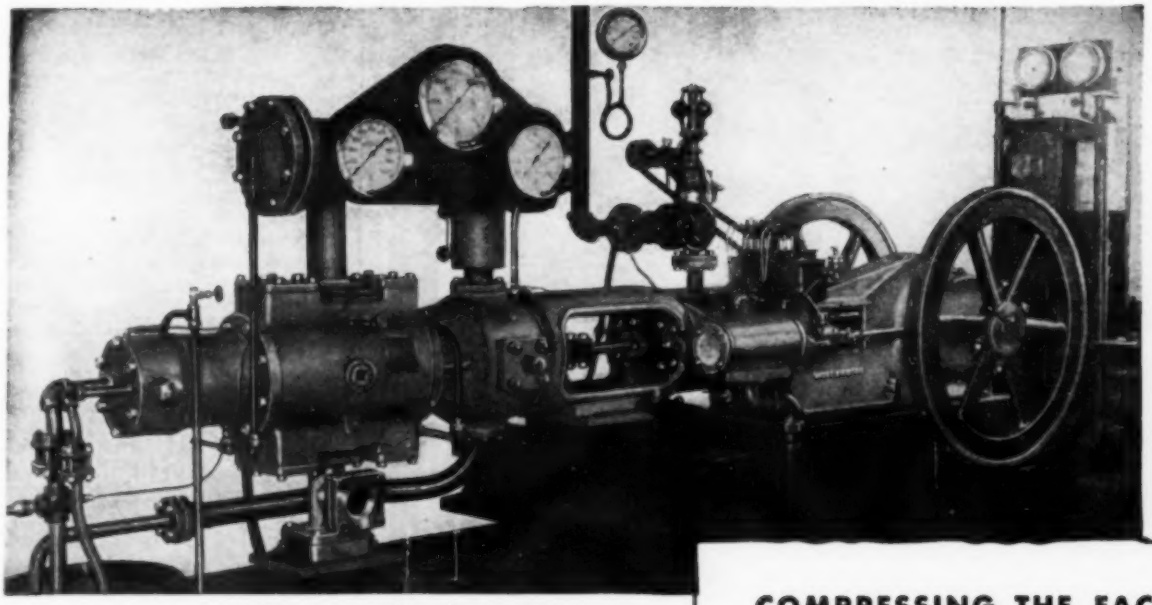
Gerald Wendt, before Seattle Chamber of Commerce, Seattle, Wash., Sept. 7, 1945.

POSSIBILITIES FOR PACIFIC ALUMINUM

WHEN we leveled off production in the United States in 1944 we had the capacity to produce about 110,000,000 tons of basic metallic and non-metallic engineering products. The iron and steel industry is about 85 percent of the total; aluminum and magnesium combined about 1.3 per cent; copper, 1.3 percent; lead and zinc, 1.8 percent; plywood and synthetic rubber slightly under 1 percent each; glass about 8 percent and organic plastics about 0.2 percent. On a tonnage basis, the glass industry is about the same size as aluminum, magnesium, copper, lead, zinc, plywood, synthetic rubber and organic plastics combined. On a volume basis, it is about one-fourth the size of all steel ingot capacity.

The West has three prime assets in respect to the establishment of a permanent aluminum industry: (1) Cheap power; (2) high caliber labor; (3) favorable climatic conditions. In contrast, the West lacks sufficient population to make it a substantial consumer of aluminum, particularly in view of the propor-

HIGHER PRESSURES AT LOWER COST



A Worthington Type HB3 single tandem three-stage compressor as installed in an important chemical plant.

With 2 Exclusive Worthington Compressor Advantages

No other three-stage high-pressure compressor can offer you these advantages:

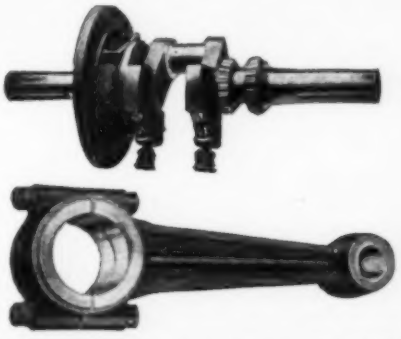
1. *Only one stuffing box*, and that subjected only to moderate pressures, minimizes leakage, so important when compressing costly or inflammable gases. Minimizes maintenance, too.

2. *Requires 20% less floor space*. Compact, without any distance pieces, the HB3 costs less in floor space and foundations than any other compressor of its kind.

Write: Worthington's Publications Department, Harrison, N. J. for Bulletin L-611-B12B, describing Worthington's exclusive Feather* Valves . . . automotive-type bearings and rods . . . steam and motor-driven HS and HB 3-stage models. *Worthington Pump and Machinery Corporation, Buffalo Compressor Division, Buffalo, N.Y.*

*Reg. U.S. Pat Off.

COMPRESSING THE FACTS



Worthington was first to use time-saving automotive-type bearings and rods on compressors, instead of old-fashioned wedge-adjustable design. *In 8 years of use, replacement of bushings has averaged only 1/10 of 1% in all HB machines installed!*

WORTHINGTON *BEHIND THE NAME*

NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-BUFFALO PLANTS
BUFFALO, N.Y.

September 12, 1945

Buell Engineering Co., Inc.
70 Pine Street
New York 5, New York

Gentlemen:

It is a pleasure to answer the recent inquiry from your Engineering Department checking upon the mechanical operation of the Buell Dust Recovery Systems installed in our three plants.

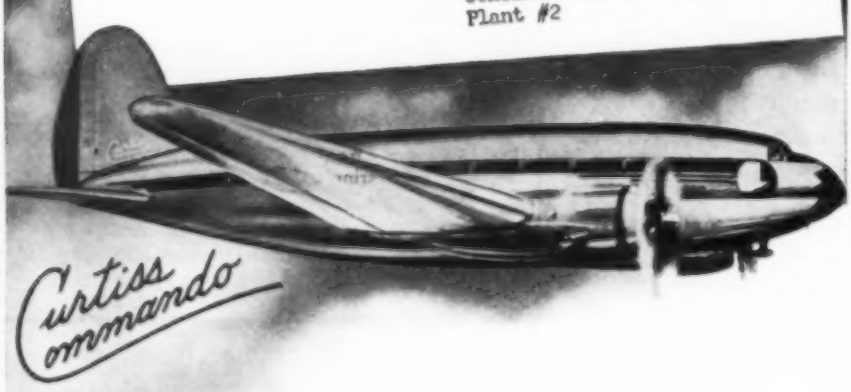
Buell Fly Ash Collectors have been in service on twelve (12) boilers since 1941, operating continuously.

Since the time of their installation, they have cost us nothing for maintenance or repair. Their collection efficiency has fully met our requirements, and they have accomplished in a highly satisfactory manner the job for which they were installed.

Yours very truly

Guy Maher

Guy Maher, Plant Engineer
CURTISS-WRIGHT CORPORATION
Plant #2



• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations. Hundreds of satisfied industrial users will attest to Buell's—"High Efficiency, Low Maintenance, Long Life."

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BUELL ENGINEERING COMPANY, INC.
18 Cedar Street, New York 5, N. Y.
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DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

tionately large amount of aluminum being made in the West. In addition, it is not in an advantageous position as regards freight rates to consuming markets. Also, cognizance must be taken of other areas with favorable power rates and close proximity to markets.

It is up to the industrialists of the West to keep an aluminum industry going, and to establish a flourishing domestic and foreign trade. This will be no easy task but the West should get a share of the Nation's business, if advantage is taken of all favorable factors. With cheap power and abundant high quality labor it should be possible to maintain reduction plants to make metal even though alumina be imported. In any event it will have to be imported in the immediate future, and now is the time to get aluminum industry established. The West should not wait until alumina processes are developed and plants built before deciding on a positive production program. Rolling, extrusion, forging and casting facilities should be maintained, and an industry producing consumer goods should be established. The higher value of the end products will result in more returns to labor and a general beneficial effect on industry and western prosperity.

Natural resources lie in power, labor and climate, and these coupled with the ability and ingenuity of capital and management can put an industry across. Take full advantage of these natural resources and the West will see a flourishing aluminum industry, not so large on a tonnage basis as during hostilities, but still substantial in size.

John D. Sullivan, Battelle Memorial Institute, before Conference on Light Metals, Western States Council, Seattle, Wash., June 21, 1945.

WHAT LICENSING COULD DO FOR THE CHEMIST

WE CAN no longer afford to indulge in the ostrich practice of sticking our individual and collective heads in the sand, denying the existence of a crisis or the need for action. Our apathy and refusal to face the fact that there is a need for unity and concerted action in common cause against the encroachments of non-professional but gaining groups is a grave threat to our acceptance and existence as a profession.

The qualifying of the professional can not be a haphazard matter of personal opinion nor can it be entrusted to the definitions and requirements advanced by self constituted national organizations. Regardless of your opinion and mine in the past, we must all realize now that legal recognition is the only way in which we can truly achieve professional status. This could be accomplished through extension and modification of the 46 existing state registration laws for engineers or by new legislation. The method of approach is not so important but the provisions of such licensing acts should be carefully considered in order to maintain the control and administration in the hands of responsible members of the profession.

Thus, by state licensing, a legal distinction can be established between the truly professional individual whose chief tool is his brain and the sub-professional whose

Acetic Acid
Acetaldehyde
Acetone
Acrolein
Alcohol, Methyl
Alcohol, Wood
Alcohols
Aldehydes
Ammonia
Amyl Acetate (Banana Oil)
Aniline
Benzine
Benzol
Benzyl Chloride
Benzyl Bromide
Bromine
Butyl Alcohol
Butyl Acetate
Camphor
Carbon Bisulphide
*Carbon Monoxide
Carbon Tetrachloride
Chloracetone
Chloracetophenone
Chloracetyl Chloride
Chlorine
Chloroform
Chlorpicrin
Collodion
Creosote
Cyanogen Chloride
Dimenthyl Sulphate
Esters
Ether
Ethyl Acetate
Ethyl Chloride
Ethylene
Ethylene Dichloride
Fluorine
Formaldehyde
Furfural
Gasoline
Hexane
Hydrochloric Acid
Hydrofluoric Acid
Hydrogen Bromide
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Cyanide and Cyanogen Chloride
Hydrogen Cyanide with Tear Gas
Hydrogen Sulphide
Japan
Kerosene
Lacquer
Methyl Bromide
Methyl Chloride
Naphtha
Naphthalene
Nicotine
Nitric Acid
Nitrobenzene
Pentane
Phenol
Phosgene
Phosphorus Pentachloride
Phosphorus Trichloride
Propane
Silicon Tetrachloride
Sulphur Chloride
Sulphur Dichloride
Sulphur Dioxide
Sulphuric Acid
Sulphur Trioxide
Tar
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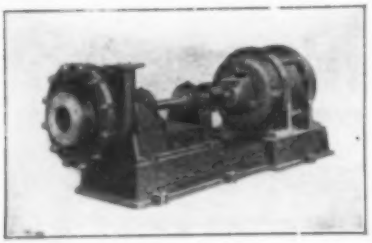
For MIXING and AGITATING

These two operations—so vital in many processing plants—are being carried on with high economy and excellent results, by special arrangements of LAWRENCE CENTRIFUGALS. The materials being handled include pumps, sludges, and mixtures carrying solid or fibrous contents, over a wide range of fluidity and both hot and cold. By suitable arrangement of piping, valves, etc., one pump may be made to serve for charging the mixing tank, for mixing and agitating, and for unloading the batch after mixing—which three-fold function results in a substantial saving in equipment cost. If you have any problems of this general character, ask our engineers to aid you with their experience. And write for the Bulletins.

LAWRENCE MACHINE & PUMP CORP.
369 Market Street LAWRENCE, MASS.



Right — Vertical Sludge Pump for mixing volatile sludge.

Left — Horizontal Pump mixing and handling sludge.

LAWRENCE CENTRIFUGALS FOR EVERY PUMPING DUTY

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(VITREOUS SILICA)

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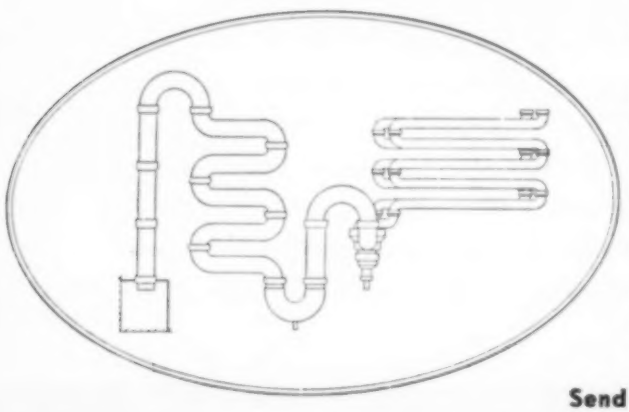

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The THERMAL SYNDICATE Ltd.

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principal tools are his hands. The professional chemist can then be sharply contrasted with the sub-professional technician who soon reaches the limit of his ability and ambition and settles down to routine repetitive determinations.

Furnished with such legal delineation and backed by an aggressive national organization, the professional chemist is in a much better position to resist the encroachment of non-professional groups and at the same time can bring about needed reforms by the same methods employed by the older organized professions.

We are lacking in realism if we do not perceive and accept the fact that now, more than ever before, our government is a compounding and blending of pressure groups essentially fluid in nature and concept and swayed usually by numerical factors alone. One well knit organization of unquestioned legal status can represent and carry far more weight for the profession than a plurality of organizations with a much larger aggregate membership and no status under law.

John D. Coleman, president, Dayton Society of Professional Engineers, before Miami Valley Chapter, American Institute of Chemists, Columbus, Ohio, May 11, 1945.

THE FUTURE OF MAGNESIUM IN THE WEST

People in the Western States have a particularly fine opportunity to continue to develop a flourishing magnesium industry. They can open here a relatively unexplored market, armed with the benefits of years of research; furnish jobs for war workers and returning veterans; give manufacturers a material which will improve their products; and all, as consumers, can enjoy the countless advantages of freedom from dead weight in the tools of production and the necessities of everyday living.

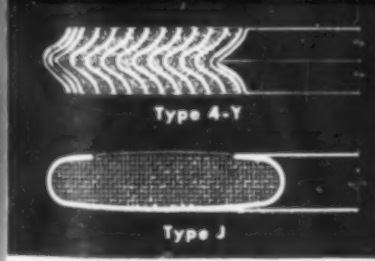
In the Western States there are already three magnesium producers—the Electrometallurgical Co. in Washington, Basic Magnesium in Nevada, and Permanente Metals Corp. in California. Out of the 55 foundries in the U. S. which are sand casting magnesium, there are only 7 located in the West, and 6 of these are in California. As for die casting plants, there are 5 Western plants, all located in California, out of a total of 14 for the country. There are no plants in any of the Western States producing magnesium wrought products—extrusions, forgings and sheet.

It seems logical, then, that some advance should be made in magnesium foundry and fabricating capacity, if manufacturers are to be able to utilize magnesium in their products. Since the forms in which magnesium is most useful to the manufacturer are sand and die castings and parts fabricated of sheet and extrusions, establishment of some new foundries, die casting plants and fabricating shops is of primary importance, while facilities for producing wrought products should be considered as soon as the demand warrants.

There undoubtedly are many foundries in this territory which could easily go into the magnesium business. Foundrymen who have had experience with magnesium have found that the techniques involved are not difficult and that in many ways

MODERN DEVELOPMENTS OF GASKET RESEARCH

BOILER GASKETS...



Standard Equipment with Leading Boiler Makers

Goetze Boiler Gaskets for handhole, manhole and tube caps are most inexpensive, highly efficient gaskets. They are used as standard equipment by leading boiler makers and are the outstanding preference of boiler operators. Type J Single-Jacketed, Metal-Asbestos Gaskets are available in a choice of metals — steel, copper, Monel, etc., for handholes and tube caps.

Goetze Type 4-Y Spiralwound — an improved Metal-Asbestos Gasket composed of interlocking plies of preformed metal, cushioned with asbestos strip and spirally wound, possesses unusual resilience — makes and maintains a perfect seal, even on badly-warped or pitted surfaces. This type is remarkably strong, highly resistant to corrosion and temperature, may be reused a number of times.

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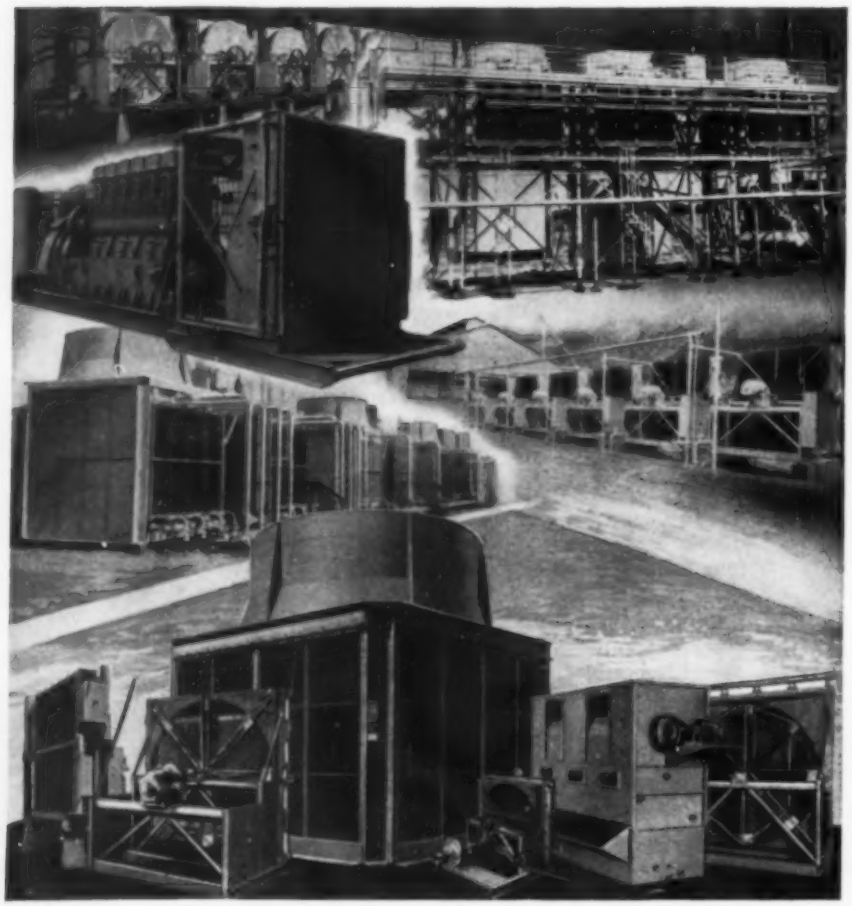
TO THE OIL FIELD AND PETROLEUM INDUSTRIES



Changes come fast in the oil industry. New processes replace old, and make new problems in heat transfer. For more than a quarter century, Young engineers have worked with petroleum and chemical engineers, solving new problems as they came. That's why Young stands ready now with the experience, "know how", and manufacturing facilities to design and produce special or standard heat transfer units for every need.

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magnesium is easier to handle than other metals.

Fabricators who have been used to handling other metals will find that magnesium is easily worked. Sheet and extrusions can be bent, formed and cut by blanking, shearing, or routing. Deeper hot draws can be made in magnesium sheet in a single operation than in any other metal. Parts can be easily welded or riveted together, or joined by screws or bolts.

Light weight obtained through the use of magnesium has innumerable advantages. In manually handled equipment it saves energy, and reduces the amount of labor required, resulting in increased production and lower costs. In mechanically or power operated devices, increased speed can be obtained for the same power consumption. Reduced inertia, resulting from the use of magnesium in moving parts of machinery, provides for better efficiency and less vibration, noise and wear. In many cases the lightness of magnesium permits simplified construction, since sufficiently strong parts can be made without the necessity of using thin sections reinforced by ribs and stiffeners.

Here is an industry that utilizes some of the vast store of natural resources in the United States. If we capitalize on the wartime expansion of magnesium and the widespread public interest it has aroused we can make the magnesium industry a vital force in our peacetime economy. The industry will take its place as one of the great examples of American ingenuity and accomplishment which make our country outstanding among the nations of the world. We hope and believe that the West will share both the responsibility and the satisfaction of participation in a significant American development.

L. B. Grant, the Dow Chemical Co., before Light Metals Conference, Western States Council, Seattle, Wash., June 2, 1945.

POSTWAR BUILDING

THE GREATEST building job in history—construction of all the nation's war plants—uncovered significant new techniques and new ways of using materials which should have an important bearing on future industrial design and should have wide application in helping to solve the nation's housing problem. If these developments can be put to work to meet future problems, we can raise the national standard of living to a point never before enjoyed in any country on earth.

Our industry owes its growth and its vitality to the operation of a free competitive system, applied to individuals as well as industries, which has encouraged full development of our economic resources. This system stands as a living rebuke to our enemies. It affords an unparalleled opportunity to future generations. Let us never destroy it.

Our homes and our commercial buildings, our cities and our towns, after years or so of inattention, offer a challenge to the engineer that must and will be accepted. For example, one big and important postwar job is in better design for our homes. We need more economical construction, improved efficiency and great

Welding the head of a large Scaife water storage tank.

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storage tanks and containers for gases, liquids, air . . .

You can "install and forget" Scaife storage tanks or containers, because of the care and attention given every detail of design and manufacture of these products. QUALITY CONTROL in our plant eliminates trouble before it starts—assures dependability and long life. If your requirements are for code manufacture, specify Scaife, and we will furnish containers that meet your code standards.

Being specialists in this type of work, we can guide you in the selection of containers to best meet your needs. Our nearest representative will gladly give you the benefit of his experience.

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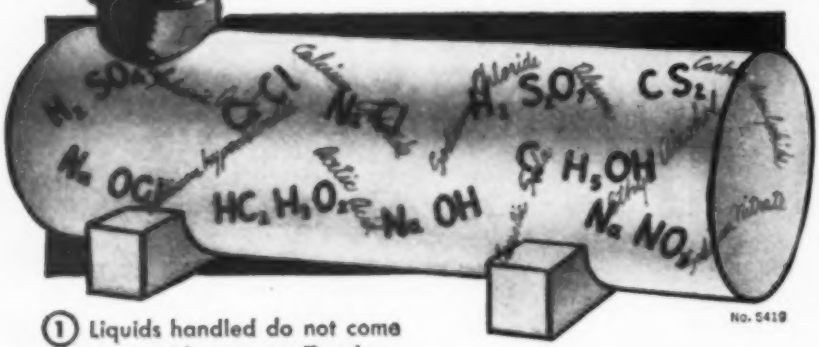

(1) Liquids handled do not come in contact with pump stuffing box.

(2) To compensate for non-lubricating properties of liquid or other chemical solutions pumped, larger bearings are used.

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attractiveness paralleling the progress in industrial building.

If we can now, in peace, attain the same desire, incentive and urgency, and the same unity of purpose as we created at war, we can literally lift the face of America to a stature worthy of a great people.

Granville M. Read, E. I. du Pont de Nemours & Co., before Engineering Society of Detroit, Oct. 24, 1945.

CONSULTANTS' CHARGES

CONSULTING chemists and chemical engineers are engaged in business, and unless they have properly functioning pecuniary glands, will all end up as examples of that cynical description of consultants—"chemists out of a job."

Except in certain specialized fields, small organizations are not in a good competitive position with respect to the large laboratories when engaging in routine sampling, inspection and analytical work. The problem of pricing such work must receive consideration, and it is probable that no one operating small organizations has ever had any careful cost accounting activities.

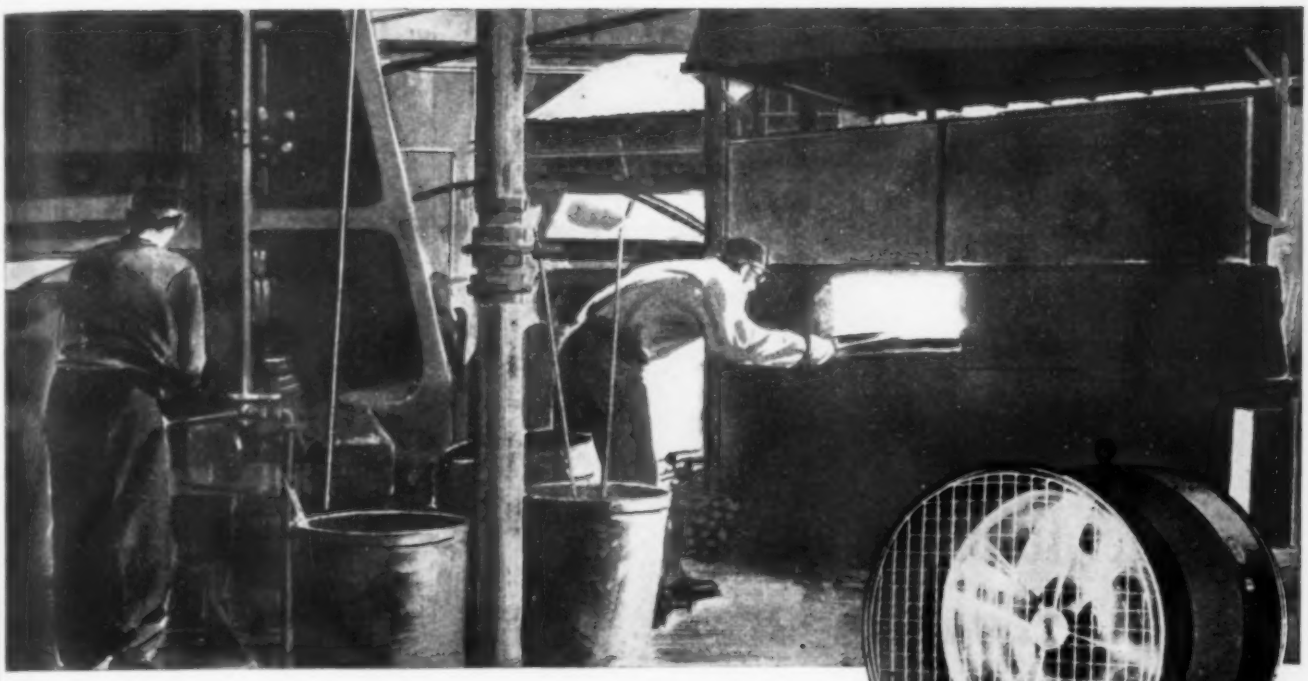
If hourly rates have any sound basis, careful consideration must have been given to corresponding salaries and overhead. Here an informal inquiry has revealed that there is a remarkable unanimity of opinion among the operators of laboratories of sufficient size to have justified some consideration of cost accounting. While formulas for calculating hourly charges vary somewhat, the average result closely approximates three times the direct labor charge. Accepting this factor, if one plots the monthly salaries against the hourly salary rate times three of the man actually engaged in the work, one finds that for a sampling rate of $3 per hour, one can afford to pay the sampler about $170 to $175 per month. This would seem to indicate that an hourly sampling charge of $3 is too low if the character of the sampling requires any real exercise of judgment. With a charge for analytical work of $5 per hour, the analyst's salary would be $290 per month. For work on the literature at an hourly rate of $5 to $10, one could use an employee receiving from $290 to $570 per month. For laboratory work of a higher order than routine analytical procedures or research work, the hourly charge of $10 would correspond to a research worker's salary of $570 per month. In general, this picture would appear to be reasonably satisfactory except for the criticism of the apparently low sampling rate of $3 per hour.

In the case of the small organization, the greatest weakness lies in charges for partners' and executives' time when they engage personally in consulting or court work.

Alvin C. Purdy, before Association of Consulting Chemists & Chemical Engineers, New York, Oct. 23, 1945.

THE MECHANISM OF SOLVENT ACTION

THE SIZE and shape of the solvent molecule influence the temperature coefficient of solvent ability, as judged by measuring the threshold concentration for solvation at different temperatures. In the range of +50 to −10 deg. C., small



COOL HEADS IN "HOT SPOTS" WON'T LET YOU DOWN

On jobs where the air is foul or hot, men can't be blamed too much for letting up now and then. If you want to keep their efficiency and morale high, feed them better air.

Employers have learned the value of putting Coppus Blowers and Ventilators on the job . . . in confined areas and near furnaces or hot processes. The men work faster, do better work, work longer without fatigue — and appreciate the more comfortable working conditions.

Give some thought now to the "hot spots" in your plant. There is a Coppus Blower for practically any requirement — Cable Manhole and Tank Ventilators, Boiler Manhole Blowers and Exhausters, Heat Killers, Shiphold Ventilators, etc. The Coppus "Blue Ribbon" is your assurance of design and construction planned for plenty of severe service. Check and mail the coupon for specific information. Address Coppus Engineering Corp., 188 Park Avenue, Worcester, Mass. Sales Offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in SWEET'S CATALOG, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG.

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- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

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- ☐ around cracking stills.
- ☐ exhausters, welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.

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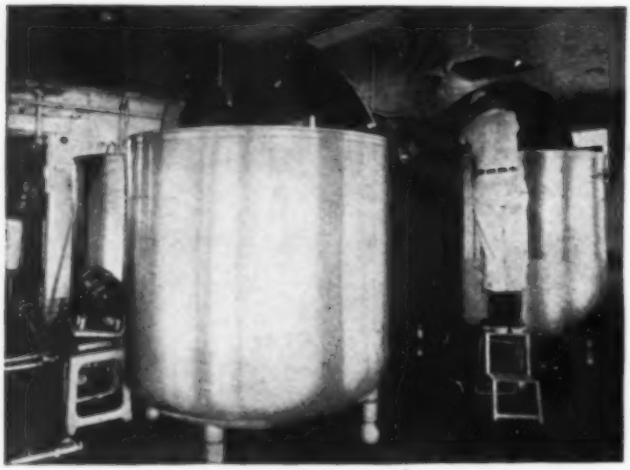
(Write here any special ventilating problem you may have)



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Division of The Edwards Manufacturing Co.

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linear molecules exhibit normal behavior and become better solvents as the temperature rises, but large linear molecules of the same homologous series behave in the opposite manner and are better solvents cold than hot. For solvent molecules of the same molecular weight, the shape becomes the determining factor with compact molecules showing the normal temperature dependence of solvent ability and extended molecules the inverted temperature behavior.

Advantage is taken of the inverted temperature dependence of solvent ability exhibited by certain solvents to prepare gels of macromolecular substances that liquefy on cooling.

A. K. Doolittle, Carbide and Carbon Chemicals Corp., at the Meeting-in-Print, American Chemical Society, September 1945.

THE CONSULTANT AS AN EXPERT WITNESS

It has long been recognized that expert testimony is necessary and proper in cases involving technical matters, particularly as judges are not usually informed regarding such matters. In such cases, experts or those specially qualified to give evidence on the technical matters involved are relied upon to supply the necessary evidence to aid the judge in deciding the case.

Expert testimony may thus be needed or proper on many different technical matters in many different cases, such as cases on contracts, insurance, accidents, compensation cases, food and drug and other governmental regulation matters, etc.; and particularly in the field of patent litigation dealing with highly technical matters over a wide field.

Expert testimony on these and other matters should be kept within proper bounds, furnishing evidence which will be helpful to the Court in reaching a decision but not presuming to usurp the function of the Court in deciding the case under guise of expert testimony.

From the very nature of expert testimony dealing with technical matters, the expert should be one qualified by training and experience to deal with the technical matters involved, such as the meaning of technical terms, and in patent cases the state of the art and the prior knowledge of the art to which the invention relates, the relation of the invention of the patent in suit thereto and the relation of the alleged infringing device to the patented invention.

Somewhat different qualifications may be required of an expert in the preparation of the case for trial, including the making of necessary investigations or the carrying out of tests or analyses or in considering and analyzing the various technical questions that have to be considered in determining which questions are deserving of presentation at the trial. It is a common experience that a large amount of investigational and preparatory work must be done before arriving at a sound basis for proceeding with expert evidence at the trial. Consultation between experts and between experts and attorneys is often necessary or helpful in the preliminary investigations, in making an analysis of the technical questions involved, in carrying out tests or experiments and in determining a sound

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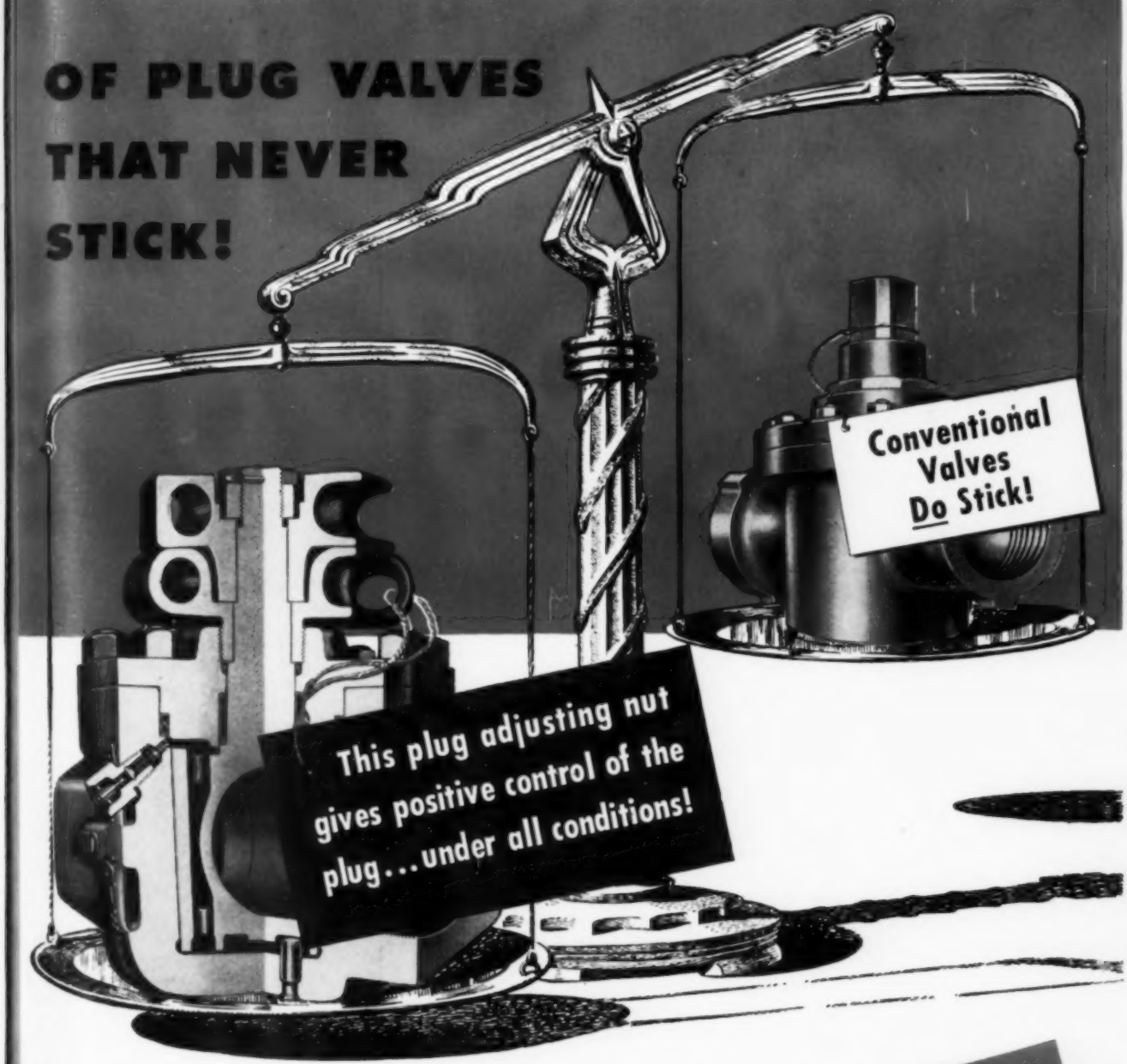

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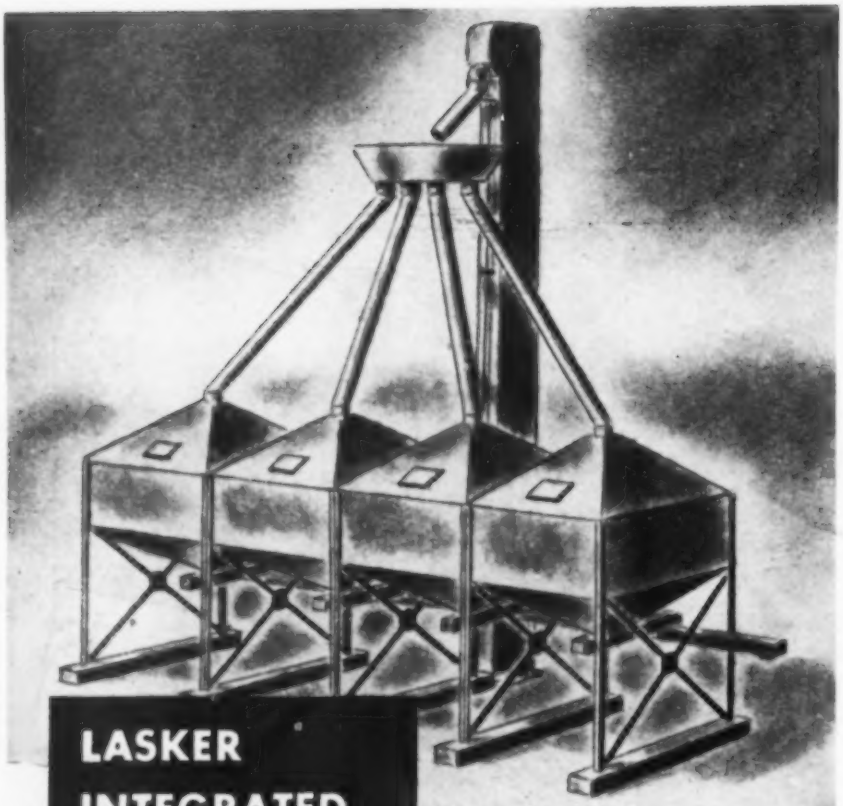

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basis of presentation of the case at the trial.

While the handling of legal questions is the function of the attorney, a knowledge of the legal principles and questions involved may be important in enabling the expert to understand the significance of his evidence and its bearing on the legal questions.

It is often necessary or desirable to carry out tests or experiments both in determining the bearing of prior art patents and publications and in preparation for demonstrations which may be desirable as a part of the evidence to be presented at the trial.

It is a part of this analysis and preparation for trial to study both sides of the case so that the expert and attorney may have as complete as possible a knowledge and understanding of the opponent's case as well as of their own, thus minimizing the danger of surprise at the trial.

Judges become skilled in sizing up witnesses, including experts, and in weighing their testimony. On technical matters, since most judges are not especially informed on them, they must rely to a large extent in many cases on the expert testimony presented. An ability to present technical matters in an understandable way so that the judge understands them is one important qualification of an expert witness. Ability to take care of cross examination by opposing counsel is another important qualification, but more completely the expert understands both sides of the case and the issues involved, the better prepared he should be for presenting the matter both as a part of his direct examination and on cross-examination.

F. E. Barrows of Pennie, Davis, Marvin & Edmonds, before Association of Consulting Chemists and Chemical Engineers, New York, April 30, 1945.

CURRENT STATISTICS ON CHEMICALS

It would be a falsity to assert that the market research in vogue today is not well served by government statistical agencies. To the contrary, a mass of data emerges regularly from these sources and is available to all interested parties. I propose a periodic abstract service to cover governmental economic releases on chemicals. This service would provide economic and commercial information paralleling that afforded by scientific abstracts, which for many years have been the tool and reliance of the scientist.

When a scientific article carrying the results of new research on chemicals appears, the salient details are published promptly in *Chemical Abstracts*. Similarly, when the government releases facts of a statistical nature, these should be promptly brought to the attention of industry in a specific manner such as will lead to the widest dissemination and the greatest usefulness. This service would identify the commodity, the source of the information, and describe the nature of the statistics. In accordance with sound abstracting procedure, an appropriate digest of the figures would comprise the essence of the abstract.

Supplied in this way with a review of

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1. CHEMICALLY RESISTANT THROUGHOUT

• • •

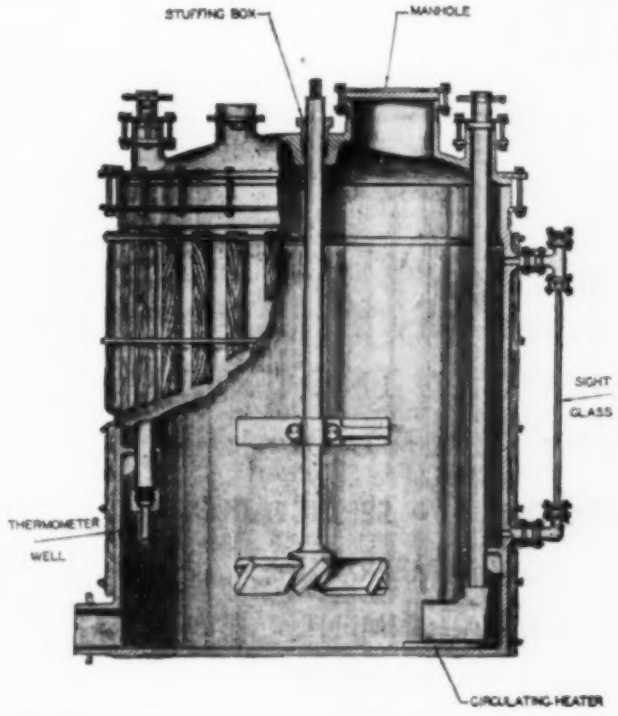
2. NOT A LINING OR COATING

• • •

3. UNAFFECTED BY RAPID TEMPERATURE CHANGES

• • •

4. MAY BE USED CONTINUOUSLY AT BOILING TEMPERATURES



5. A TOUGH, STRONG, RESILIENT PLASTIC

• • •

6. SEAMLESS ONE PIECE UNITS AS LARGE AS 10 feet DIA., 12 feet HIGH

• • •

7. STANDARD SIZE
TANKS
TOWERS
PIPING
VALVES
FITTINGS
PUMPS
ACCESSORIES

THE ABOVE ILLUSTRATION IS FROM HAVEG ENGINEERING BULLETIN F 8 IT SHOWS A HAVEG TANK WITH HAVEG ACCESSORIES . . . AGITATOR . . . HEATER MANHOLE . . . INLETS & OUTLETS . . . THERMOMETER WELL . . . AND SIGHT GLASS

HAVEG is made of asbestos fibres, bonded together with a synthetic resin, under heat and pressure. Equipment molded of HAVEG is strong, tough, resilient and durable. Scatches or gouges do not impair its chemical resistance since HAVEG is chemically resistant throughout its entire mass. Except for obvious good engineering practice HAVEG chemical equipment requires no special handling.

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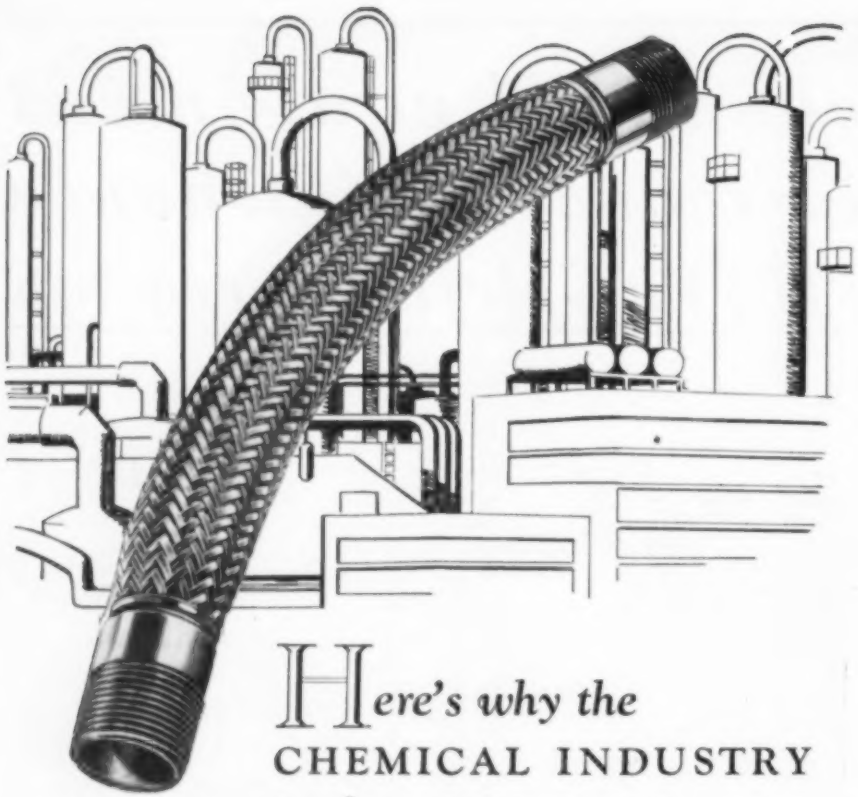

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current statistics on chemicals, the marketing specialist could quickly establish the factual horizon of his problem and proceed from there. He would not long remain in doubt as to the extent of statistics available, nor commit an error by possibly overlooking the one source of data meeting his problem. He would not need to know which government agency collects the data; that would be stated in the abstract, for any follow-up.

While this suggestion limits the scope of the material to be abstracted to governmental releases, there is no reason for not ultimately extending the idea to non-governmental reports of an appropriate character. The various trade associations issue reports which, while not the result of original surveys, are nevertheless serviceable in market research. These ought not be overlooked.

If the idea of an abstract service covering the field of chemical statistics becomes a reality, such action will mark a milestone in the history of chemical market research. The chemical industry during the war period has learned to value the statistical phase of its affairs more than ever. Now is the time to establish this phase on a solid basis, with attendant benefits to industry.

L. N. Markwood, Bureau of Foreign and Domestic Commerce, before Chemical Market Research Association, Washington, Sept. 12, 1945.

POSTWAR ALUMINUM

Two recognized scientific methods exist for making market surveys. The first is by use of statistical techniques for forecasting the future on the basis of past experience and estimated trends. The second is by actually talking to a large enough number of consumers to find out what their plans are for the use of the product, how much they actually plan to use. We used both methods concurrently.

Our statistical staff undertook the task of estimating the postwar market for aluminum on the basis of prewar experience while our field staff went out talked to industrial consumers of aluminum and magnesium. The final results secured by the two methods were surprisingly close.

Our findings are presented in a series of charts.

The selected years covering the prewar market for aluminum, based on official government statistics, show the experience before and after World War I. In 1913 the total was but 56 million lb. of aluminum, of which 9 million lb. were secondary metal. The war demand raised production to three times the 1913 level. The total for the second postwar year or 1920 was still three times the 1913 figure. The next year, 1921, witnessed a recession to 72 million. lb. Thereafter began a steady gain to 306 million pounds in 1930. The depression, of course, took its toll but even so the low point, 1934, was 167 million pounds. However, secondary metal accounted for over half of this figure or 93 million pounds, about the only year on record in which more secondary than primary metal was used, the normal ratio being about 40 percent. The last five years shown, 1935-1939, averaged

RAISING THE ROOF WITHOUT GETTING IN A JAM

Remember how tough it was to make a collapsible drinking cup telescope shut if one section got out of round?

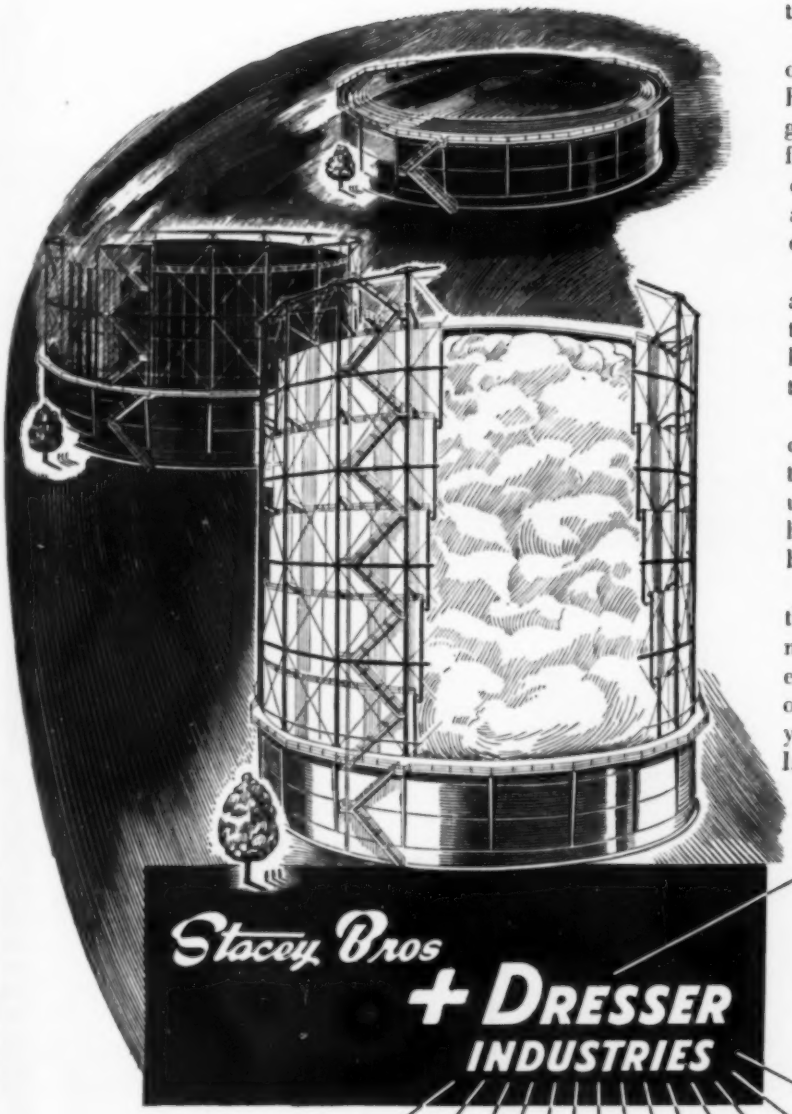
What a job you'd have with a telescoping structure 640 feet in circumference! The five million cubic foot, all-welded, wet-seal gas holder, for instance, now being engineered in California by Stacey Bros. Gas Construction Co., one of the Dresser Industries. It's the largest of this type ever designed for all-welded construction.

The sections are being built, one inside the other, like a huge drinking cup upside-down. Each section must slide up and down with the gas volume. But the sections, coupled by a water-filled device can have only four inches clearance on a diameter of over two hundred feet! That's actually fine precision, if you take a giant's eye view.

The sections are made of steel plates. Unavoidably, welding causes the steel to buckle yet the plates have to be welded on both sides. If the buckle becomes bad enough it can jam two sections when the roof of the holder is raised.

Engineers of Stacey Bros. said why not weld only one side of each section on the ground; then devise a means of getting the whole holder up in the air in finished position with the first buckles ironed out and the true roundness held before completing the job of welding.

This, Stacey Bros. engineers accomplished and the method of erecting holders is so unique it's now patented, one of many strokes of creative engineering that have given Stacey Bros. an overwhelming majority of contracts. Whenever you think of any member of Dresser Industries, Inc., think of *Creative Engineering.*



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Back of every product of every member of the group of companies stands Dresser Industries, Inc.—strengthening the resources; co-ordinating and stimulating engineering, production and distribution for its member companies. This is the Plus of Dresser Industries. To customers of every Dresser member this Plus is passed on through the products they buy—a Plus Value.

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DRESSER Manufacturing Div., Bradford, Pa.

DRESSER Manufacturing Company, Limited Toronto, Ont., Canada

INTERNATIONAL Derrick & Equipment Co., Columbus, Marietta & Delaware, Ohio; Beaumont, Texas; Torrance, Calif.

KOBE, Inc., Huntington Park, California

PACIFIC Pumps, Inc., Huntington Park, Calif.

PAYNE Furnace Co., Beverly Hills, Calif.

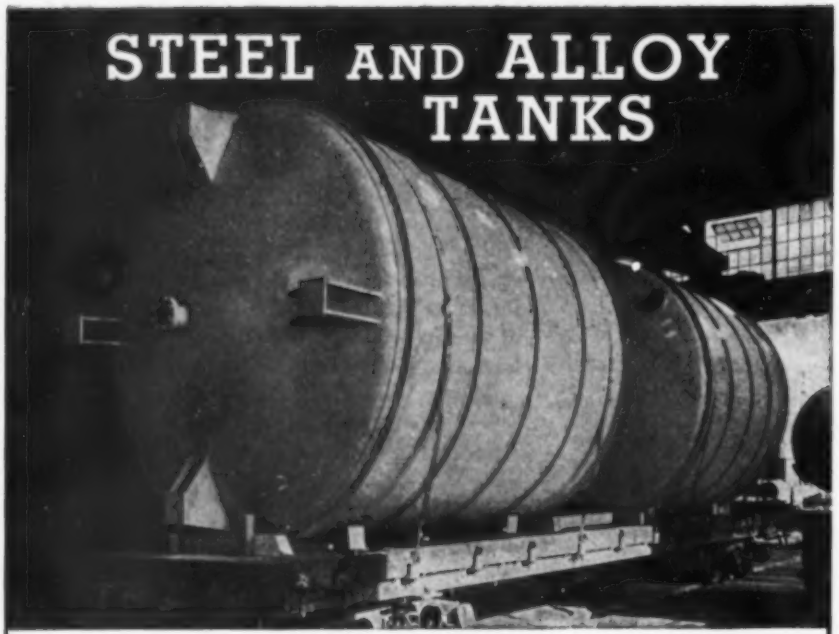
ROOTS-CONNERSVILLE Blower Corporation, Connersville, Ind.

SECURITY Engineering Co., Inc., Whittier, Calif.

STACEY BROS. Gas Construction Company, Cincinnati, Ohio

VAN DER HORST Corporation of America, Olean, N. Y. and Cleveland, Ohio

STEEL AND ALLOY TANKS



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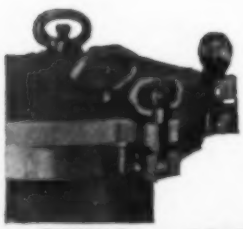

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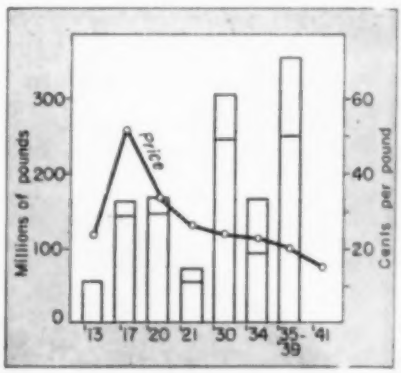
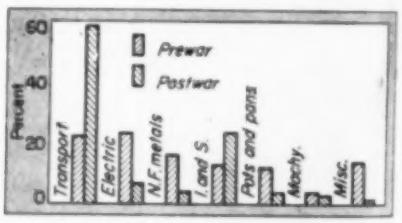
353 million lb. of which about 250 million were primary metal.

The price trend for virgin aluminum rose to 51.6c. in 1917, the peak of World War I. From the peak the price of aluminum dropped and, unlike the first World War, and unlike most other commodities during this war, the price of aluminum during World War II, dropped still further to 15c. where it now stands.



Let us now look at the prewar market for aluminum by industries. Out of a total averaging 257 million lb. of virgin metal per year, the electrical industries accounted for 23.7 percent with transportation a close second. Nonferrous metals and metal products took 15.9 percent of the market while the iron and steel industry used 12.4 percent. Cooking utensils, one of the earliest and best known outlets of aluminum, took 12 percent of the total. Machinery industries used but 3.5 percent, while miscellaneous users including metal jobbers accounted for the remaining 14.1 percent.



This industrial pattern is expected to change radically. Five years after the war the rail, auto, and air transport industries may take from 56-59 percent of a postwar market ranging from 1,500 million to 1,700 million lb. of primary and secondary aluminum. The iron and steel industry expects to absorb 24 percent of the larger total; the electrical industry, 6-8 percent for electrical products and transmission lines; nonferrous metals from 3-5 percent; cooking utensils 3½ percent; machinery 2½ percent and the remainder, about 1 percent by miscellaneous industries. In all fairness we must confess that our sample of miscellaneous industries was very small. We know that there will be a large demand for aluminum for paints, for powder metallurgy, and for other uses which it was impossible to measure. Incidentally, we discovered and listed some 1,500 different uses for aluminum as a part of our survey.

You may be interested in our appraisal of the probable consumption of aluminum, both primary and secondary, in

Proved in Food Products! C. P. glycerine is a food itself, substantially equivalent in food value to carbohydrate. It has high sweetening power. No wonder it's used by so many manufacturers!

Proved in Cosmetics! C. P. glycerine's non-toxicity, emollient properties, resistance to evaporation, solvent power, and compatibility make it ideal for use in many cosmetics. Use glycerine!

Why Glycerine is a Superior Humectant: PERMANENCE

GLYCERINE as a humectant is permanent. Its permanence is a result of its low vapor pressure, its compatibility with hydrophilic materials, and its lack of tendency to "creep."

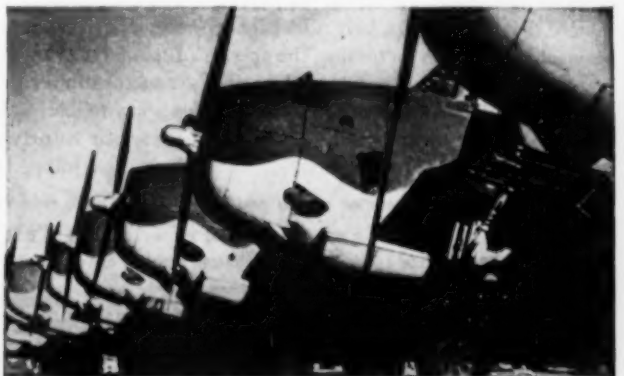
In the absence of a permanent humectant, glues dry out and are no longer adhesive and flexible; paper wrappings become dry and brittle; tobacco gives a less smooth and mellow smoke; cosmetics and dentifrices cake and crack; certain leather products become harsh and rough.

Does the adhesive on your scratch-pad or in a bookbinding become brittle? If so, the chances are that it has not been plasticized with glycerine but with some other material.

Glycerine is not only a superior humectant but a preferred plasticizer, solvent, carrier, preservative, lubricant, and key component in many essential products and materials. Its high viscosity, high solvent power, compatibility, non-toxicity, and other valuable properties can help you make superior products. Use glycerine, the time-tested ingredient, now freely available for the production of civilian goods. Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y., Dept. E-8.

Proved in Medicines! C. P. glycerine, used as a solvent, carrier, and component of ointments, emollient solutions, plasters, and many other pharmaceuticals, is an old standby — proved safe.

Proved in Packaging! Because C. P. glycerine is non-toxic, it is used in the manufacture of transparent wrappings coming in contact with foods or food products. Use glycerine—and be sure!



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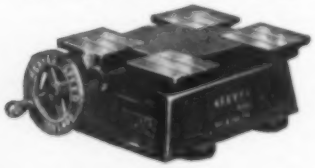
How to convert any standard constant speed motor to a low-cost Stepless Variable Speed Drive . . .

1

Mount Your Motor on This REEVES Motor Base



Base is built in wide range of sizes to fit any standard constant speed motor up to 15 h.p. Includes sliding platform and handwheel for moving motor forward or back.

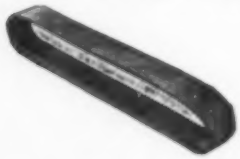
2

Apply This Disc Assembly to Motor Shaft

Assembly consists of two facing cone-shaped discs, one stationary, the other sliding laterally, and compression spring for mounting on extension shaft of motor.

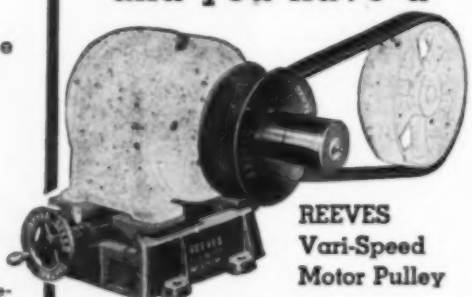
3

Connect to Driven Machine With This Special V-Belt



Place specially designed REEVES V-belt between discs and over pulley on power input shaft of the driven machine. Adjust belt to minimum center. Anchor motor base.

and you have a



REEVES Vari-Speed Motor Pulley

available in sizes to 15 h.p. for stepless speed adjustability within 4:1 range.

HOW IT WORKS: The operation of a REEVES Motor Pulley is extremely simple—yet it follows the time-tested REEVES principle of a V-belt traveling between the adjustable driving diameters of cone-shaped discs. By turning handwheel, motor is moved forward or back on base, varying the driving diameters of the discs. As motor is moved toward driven machine, belt rides higher between discs, thus increasing the speed transmitted. Turning handwheel in opposite direction reverses the operation. Any speed within the range is accurately maintained.

WHAT YOU CAN DO WITH IT: The REEVES Motor Pulley is the simplest dependable method of providing infinitely variable speed adjustability to a driven machine. With this low-cost, easy-to-install equipment you can transform a machine with fixed speeds into a far more versatile production unit—one that is instantly responsive to every changing condition and work schedule. Install REEVES Motor Pulleys on your machines in service, and when you buy a new machine, look for the familiar REEVES handwheel that signifies REEVES-equipped.

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Accurate Variable

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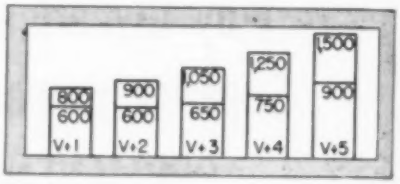
Gives the Right Speed for Every Job!

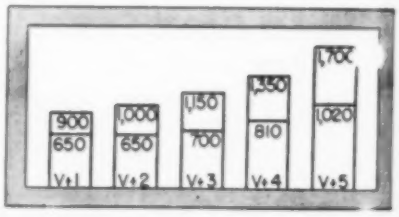
each of the first five postwar years. If the price remains at 15c. for virgin metal it is anticipated that total demand the first full postwar year may run to 800 million lb. of which 200 million will be for secondary metal. It is recognized, of course, that there is a large stock pile of scrap aluminum in the hands of the government and that the actual market will be greatly affected by government policy as to release of this metal and price. We have been called on to make recommendations to the government on this subject and have gone into it quite thoroughly. These estimates are based on our thoughts as to what would be an orderly release of scrap metal over the first five postwar years. What the actual policy will be remains uncertain at this time.

We anticipate that the total demand will increase from 800 million to 1,500 million lb. over the first five postwar years



if the price stays at 15c. and at the end of that time the demand for virgin aluminum may be as great as 900 million lb. a year.

If the price should be lowered to 13c. for virgin metal and somewhat larger demand is foreseen, ranging from 900 million pounds the first year to 1,700 million the fifth, of which the demand for virgin metal is expected to reach 1,020 million by the fifth postwar year.



Our analysis of operating costs in aluminum plants, indicates that at a price of 13c. for virgin aluminum, total effective capacity (that is capacity that can compete at 13c.) will be reduced from the present 2,300 million to about 1,500 million lb. Thus if the market should follow the trend we have projected, to aluminum reduction industry would be able to operate at about two-thirds capacity by the fifth postwar year. In view of the long range trend towards a wider use of light metals, the industry would be in a sound position with capacity for the additional growth to be exported after the five years elapse.

Moreover, this survey was limited to the domestic market in the United States. Should foreign demand develop, as it well may, especially in the Pacific, the outlook for aluminum reduction would be even brighter.

One further chart completes our discussion. This reveals the probable regional breakdown of the United States market. Based on studies of regional consuming

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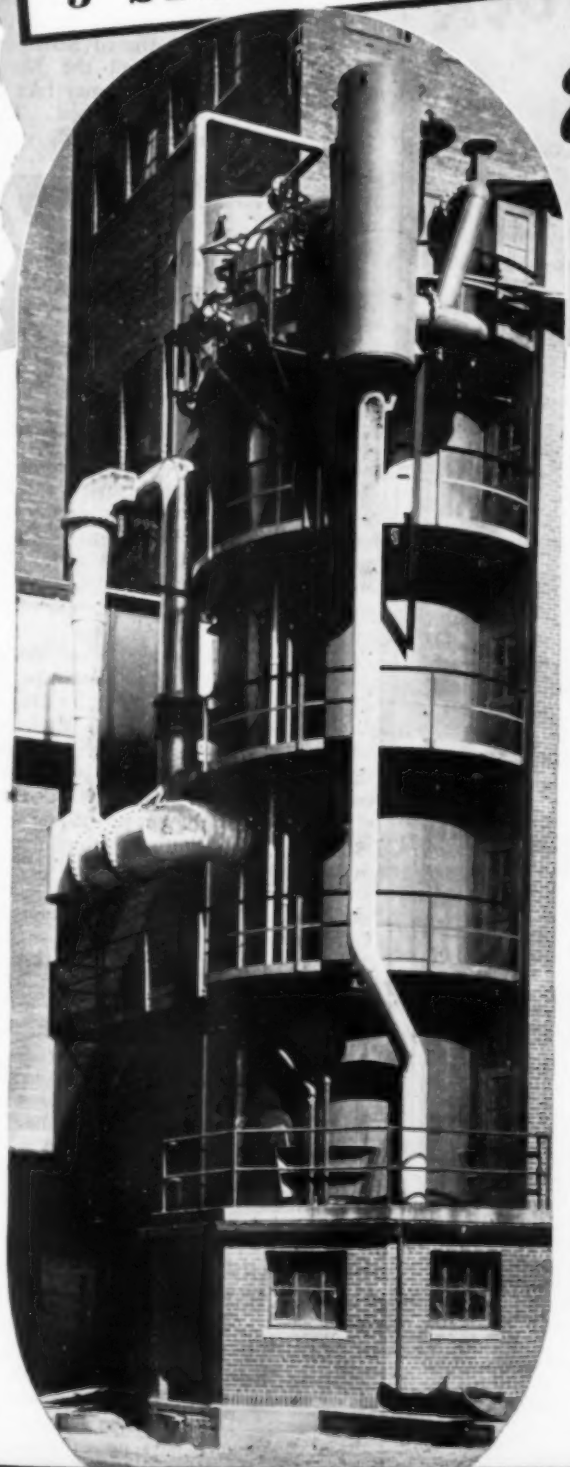

The GUARDITE 5-stage Evaporative Cooler shown at the left cools 376,000 lbs. of distillery mash per hour, from 190 deg. Fahr., with only 5925 gpm of 96 deg. cooling water and 7330 lbs. of steam per hour. It is located at Hiram Walker & Sons plant at Peoria, Illinois.

GUARDITE Coolers operate continuously. They have complete flexibility throughout the entire design range. They are self cleaning and completely automatic.

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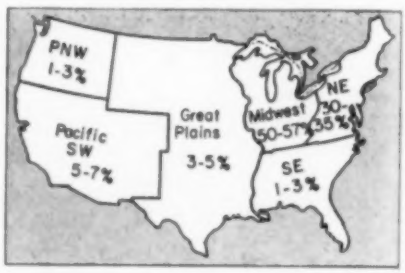
centers and estimates of future trends we submit these figures as reasonably approximate answers as to where the markets may be found. At the top of the list lies the mid-west market surrounding the Great Lakes. This market is expected to take from 50-57 percent of the total aluminum consumed in the United States. No primary aluminum is produced in this territory. Second in importance is the northeastern corner of the United States including New England and the North Atlantic states. This region may take as much as 35 percent of the total. The Great Plains region is a relatively small



market with a sales potential of from 3-5 percent. The Pacific Northwest and the Southeast, the two largest producing centers, are small consumers, with estimated markets for but 1-3 percent each. The remaining region, the Southwest is expected to absorb from 5-7 percent of the nation's total.

It is clear from this regional analysis that market for western aluminum lies largely in the Midwest and the Northeastern states. The latter can be reached easily and cheaply by water transport through the canal, although competitive rail rates may be available. Our studies of delivered cost to market centers indicate that Pacific Northwest aluminum reduction plants can compete effectively and profitably with any other plants in the world in reaching the great aluminum markets surrounding the Great Lakes.

It should be added, however, that the abundance of high grade and relatively cheap aluminum, to say nothing of the low-cost hydroelectric power, and the thousands of skilled aluminum workers in the Pacific Northwest point to the desirability of building large aluminum consuming centers in the West, thus expanding the local markets.

N. H. Engle, University of Washington, before Conference on Light Metals, Western States Council, Seattle, Wash., June 21, 1945.

SECONDARY RESULTS OF ATOMIC ENERGY

MOST sources of radioactivity presently available for industrial applications gave mixtures of various types of such activity. Some components of these present-day forms are ideal for certain applications, but other components have no particular use and serve only to cancel part of the effectiveness of the useful portions.

With the new knowledge of plutonium, uraniums 235 and 238, and their fission, it should be possible to produce very cheaply, via neutron bombardment, a synthetic radio-active compound of specified properties for a definite job. A manufac-

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Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

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No valves, pistons, or vanes.

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75 pounds in a single stage.

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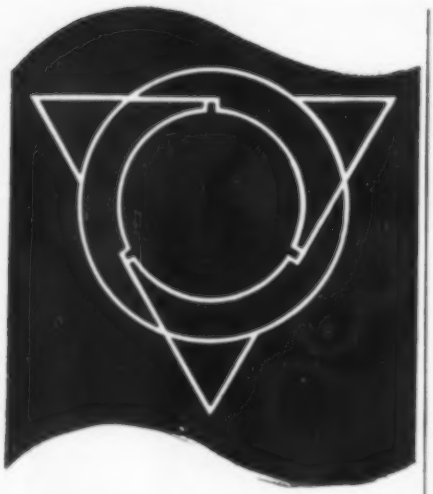

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turer who is now using X-rays or radiography for examination of his product, will then be able to purchase, at a far lower cost, a specific synthetic radioactive element, with properties adapted to his special problems, and one which will give much more exact results.

Application of these new synthetic radioactive tools in the field of metals has at least three important sectors open. The first, and possibly the most fundamental, will be in studies of the basic principles of alloys. The second will be in the manufacture and shaping of equipment. The third will be in studies of corrosion and other types of failure of the finished product while in use. There will probably be many other applications, but at the moment, these three look most promising.

R. E. Fearon, Wells Surveys, before 1945–46 opening meeting, Mid-Continent Section, AIME.

FOREIGN LITERATURE ABSTRACTS

DETERMINATION OF MOLYBDENUM IN STEEL

Since constancy of color in determination of molybdenum cannot be attained by the Eder method, a better method was sought by the authors. The following procedure was found satisfactory: 0.5 g. of steel filings was introduced into a 250 cc. flask and treated with a sufficient quantity of an acid mixture to dissolve them, the mixture consisting of 150 cc. of concentrated sulphuric acid and 150 cc. of phosphoric acid (d = 1.7) per liter. After being dissolved it was oxidized with 10 cc. of nitric acid and the nitrous vapors driven off by boiling, the mixture cooled and the flask filled with water up to the mark. 10 cc. of this solution was then placed in a 50 cc. flask and the following added in succession: (1) 20 cc. of an acid mixture containing 100 cc. sulphuric acid (d = 1.84) and 50 cc. nitric acid (d = 1.4) per liter; (2) 10 cc. of 12.5 percent potassium sulphocyanide and (3) 10 cc. of a stannous chloride solution containing 100 g. of that salt and 100 cc. hydrochloric acid (d = 1.19) per liter. This mixture was stirred well and the determination made after one to five minutes.

Digest from "Improvement in the Eder Method for the Colorimetric Determination of Molybdenum in Steel" by F. Vollmert and A. Konig, *Stahl. u. Eisen.*, 790, 63, 1943. (Published in Germany.)

PARAFFIN ISOMERIZATION

Use of aluminum chloride in isomerization of paraffins results in conversion of polyalkylbenzenes to alkylbenzenes which have a smaller number of corresponding alkyl groups and, simultaneously, to the more highly alkylated benzenes, as well as in autodestructive alkylation. Aluminum chloride was found to bring about decomposition of the side chains of a number of naphthenes, forming polymethylated cyclohexanes. Conversion of isobutane with aluminum chloride yielded propane and also a small amount of isopentane, while normal pentane and isopentane were converted to a mixture of isomeric butanes and isohexanes in addition to higher-boiling hydrocarbons. The yield of isomeric hexanes was from 12 to 17 percent of the pentanes used, and 2,2-dimethylbutane accounted for up to 67 percent of the hexanes. This hydrocarbon is formed in such large quantity due to the ease of methylation of a tertiary carbon atom. This, however, does not explain why the action of aluminum chloride on isobutane yields isopentane instead of the expected 2,2-dimethyl propane. Starting with isopentane, methylation and demethylation can occur as follows:

$$2CH_3CH(CH_3)CH_2CH_3 \rightarrow CH_3C(CH_3)_3CH_2CH_3 + CH_3CH(CH_3)_2$$

Formation of higher-boiling hydrocarbons than the hexanes may be due to further methylation of the hexanes formed as well as to the reactions of autodestructive alkylation.

Digest from "Isomerization of Hydrocarbons. VI Investigations of By-Products formed in Isomerization of Butanes by Aluminum Halides and the Mechanism of their Formation" by B. Moldavski, E. Nebilova and T. Nizovkina, *Zhurnal Obshchei Khimii* 14, 343, 1944. (Published in Russia).

DRYING BY INFRARED RADIATION

Infrared radiation has undoubtedly found its most widespread application in the paint and varnish industry where it is used to accelerate drying time. This greater speed in hardening paints and varnishes is the result of a purely thermic phenome-

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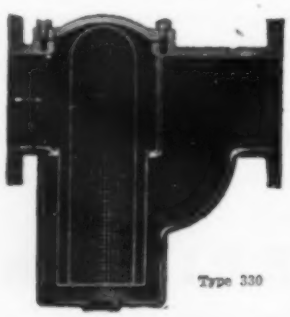

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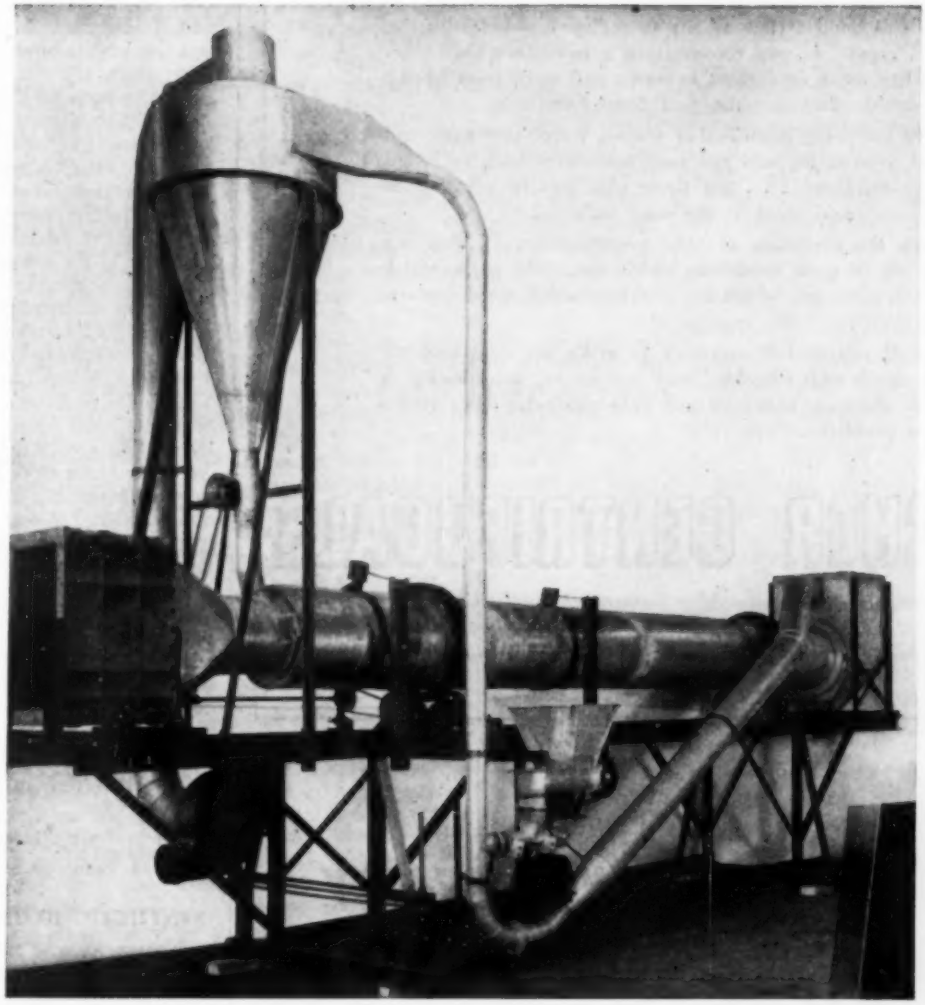

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non. Ordinarily, elimination of the solvents contained in the paints and varnishes is held back by the already hardened outside layers. Infrared radiations, on the contrary, are absorbed to greater degree the deeper the penetration. The outside layer therefore dries less rapidly than the inside layers and the solvents can be eliminated much more readily. There is also another fundamental difference. In drying with infrared rays the heat is produced instantly in the layer which is to be dried while in the ordinary process the transmission of heat is a convective process affected by a very low coefficient of utilization. The temperature of an object which is drying in warm air is always lower than that of the air, whereas the temperature of materials which are drying by infrared radiation is higher than that of the surrounding air.

Various factors must be considered in setting up an installation for drying with infrared rays. Lamps are used which have tungsten filaments which can attain temperatures of up to 2,760 deg. (one thousand degrees more than the carbon filaments used formerly). The rays are directed by reflectors for which silver (92-98 percent) seems to be the most satisfactory coating metal. Gold is less active but more durable. Copper is a good reflector but it oxidizes rapidly. Aluminum is also used. The arrangement and number of lamps is determined by the dimensions of the objects to be dried as well as other factors. Generally, the sources of radiation are placed in a tunnel through which the materials are passed continuously. Circulation of air in the tunnel, necessary to take out the solvent vapors, is adjusted in relation to the intensity of irradiation. If the air circulates rapidly, the radiation must be increased.

Digest from "Infrared Radiation and its Applications," *Rev. Prod. Chim.* **46**, 33, 1943. (Published in France.)

SYNTHETIC RUBBERS

Numerous new plastic and elastic products of filiform structure have been developed in recent years which are now used as substitutes for rubber and which will play important roles in the near future. A study of such materials was made by classifying them according to their chemical constitution as follows:

I. Products which contain carbon and hydrogen:
- A. Higher paraffins;
- B. Polyethylenes;
- C. Polyisobutylene;
- D. Butyl rubber;
- E. Butadiene;
- F. Isoprene;
- G. Methyl butadiene;
- H. Dimethyl butadiene.

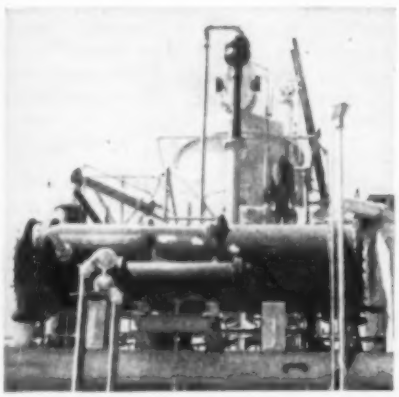
II. Products which contain carbon, hydrogen, oxygen and sulphur:
- A. Vinyl polyacetates and derivatives;
- B. Acrylic and methacrylic resins;
- C. Olefin polysulphides.

III. Products which contain carbon hydrogen and chlorine:
- A. Vinyl polychlorides and copolymers;
- B. Neoprene;
- C. Methyl chloroprene.

Digest from "Plastic and Elastic Materials of Filiform Structure" by A. Durr, *Plastiques* **2**, 13–18, 1944. (Published in France.)

CHEMICAL ENGINEER'S BOOKSHELF

LESTER B. POPE, Assistant Editor



Part of a recent installation of equipment used in an improved process for extraction and purification of penicillin at the Cutter Laboratories in Berkeley, Calif.

HALF TOLD TALE

YELLOW MAGIC, THE STORY OF PENICILLIN. *By J. D. Ratcliff. Published by Random House, New York. 173 pages. Price $2.*

Reviewed by John R. Callaham

As EXCITING as any adventure in science throughout the ages, the story of penicillin reveals a stirring epoch of our time. There is no doubt that the development and large-scale manufacture of this mold-derived drug will bring about a new trend in medicine—an era of antibiotics. Already, with commercial production of penicillin scarcely more than two years old, streptomycin and possibly other similar products appear to be ready for commercialization. In fact, penicillin itself may go down in history principally for two reasons: as a great saver of lives during the latter part of World War II and, eventually far more important, as the stimulus and inspiration for many other important discoveries in the field of medicine.

Penicillin, probably more than any other single event, has brought the fields of medicine and applied chemistry so close that some of the finer distinctions between the two begin to merge. It has made the medical profession realize that henceforth it will be far more dependent on the chemical industry. It has made the chemical engineer conscious of the fact that, without his knowledge and skill, the enormous potentialities of this new drug and all others to be inspired by it would never have been realized. It has given new emphasis to fermentation as a chemical process and has strikingly demonstrated the accelerated penetration of the basic principles of process engineering into all industry.

Most important, penicillin has succeeded in demonstrating to the average American that the creative forces in applied science are far greater than those of destruction; that the same breed of men that devise the most destructive weapons of war also create the sulfa drugs, penicillin, DDT, blood fractions—weapons for humanity that can directly or indirectly and not too far in the future, save more lives and avoid more destruction than have been so criminally wasted in wars.

Although written primarily for the non-technical reader, the story of penicillin as told by Mr. Radcliff is absorbing reading, albeit a bit on the dramatic side. It describes the hopes and fears, gamblings against failure, scientific technique and logic used by the men who did the basic research on penicillin, its production, properties and clinical uses. Outside the preface, however, little space is given to an account of the outstanding engineering and construction job by the commercial producers of the drug, nor to the remarkable production record that has pushed the output far beyond all expectations, vastly improved the quality of the product and lowered the cost to the point that penicillin is now, on a dosage basis, one of our cheapest drugs.

The industrial history of penicillin shows what our chemical engineers, bacteriologists and other industrial scientists, backed by private capital and encouraged by liberal executives, have accomplished—a feat that all the research scientists in the world, with brains and bare hands alone, could never repeat. It is for this reason that Ratcliff's book needs a sequel in order to complete this astounding story of penicillin.

LECTURES

MAJOR INSTRUMENTS OF SCIENCE AND THEIR APPLICATIONS TO CHEMISTRY. *Edited by R. E. Burk and Oliver Grummitt. Published by Interscience Publishers, New York. 151 pages. Price $3.50.*

Reviewed by E. K. Jaycox and K. H. Storks

THIS small book comprises a series of six lectures presented to graduate students at Western Reserve University by a group of eminent experts in their respective fields. Electron diffraction is covered by Dr. L. H. Germer, the electron microscope by Dr. L. Marton, X-ray diffraction by Dr. M. L. Huggins, emission and absorption spectroscopy by Dr. W. R. Brode and the infrared spectrometer by Dr. R. B. Barnes.

Each lecture contains a brief presentation of the fundamental factors necessary to understand the discussion of a few more or less representative problems to which the instrument is applicable. These problems are taken from both pure science and industry. Sufficient material is included to serve as a guide for a student or research worker selecting tools useful for his particular needs. The bibliographies are adequate to assist one in starting an exhaustive study of any one of the respective fields.

ALMIGHTY ALCHEMY

ALMIGHTY ATOM, THE REAL STORY OF ATOMIC ENERGY. *By John J. O'Neill. Published by Ives Washburn, New York. 94 pages. Price $1.*

Reviewed by S. D. Kirkpatrick

AMONG the amazing array of books and pamphlets that have hit the newsstands since mid-August, this one is outstanding for a number of reasons. Its author, who won a Pulitzer price for his popular writings on scientific subjects, was one of the first to predict the practical possibilities in atomic fission. Articles in his newspaper's columns in 1937 and in *Harper's* in 1940 accurately appraised the significance of the discoveries at Columbia University and elsewhere throughout the world. That he was "scooped" by prematurely confiding his views to one of his more agressive and now much more famous colleagues seems to be fairly well established throughout the journalistic fraternity.

But some of us who have held such high hopes for this book have been keenly disappointed. It has the form and appearance of the cheapest war production. It shows unmistakable evidence of hasty writing—careless errors of arithmetic as well as faulty organization and tiresome repetition. But the much more serious criticism is that the concluding chapters on the possible applications of atomic energy are so badly distorted as to give the laymen a most misleading picture of the future of this whole development. Under such headings as "Extinction Faces the Coal Industry," "Can Petroleum Survive," "What Will Happen to the Automobile, —to the Railroads,—to Public Utilities" we find nothing but fantastic predictions of the sort that any scientist or engineer would condemn in amusement or disgust.

All this is most unfortunate, not only because of the author's fine reputation, but also because the first half of his book is

RECENT BOOKS RECEIVED

American Petroleum Refinery. 3rd ed. By H. S. Bell. Van Nostrand. $7.50.

Introduction to Industrial Chemistry. By W. T. Frier & A. C. Holler. McGraw-Hill. $3

Scientific Societies in the United States. By R. S. Bates. Wiley. $3.50.

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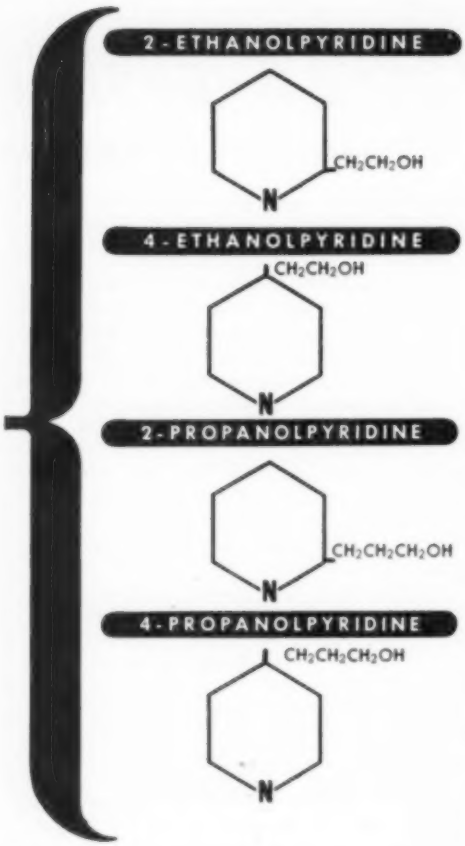

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exceedingly interesting and informative. His chapters on the fundamentals of nuclear physics, on the source and origin of atomic energy, and his review of the creation of the universe itself are well worth reading. Seldom has this reviewer found such a clear and easy exposition of a subject that is inherently difficult to comprehend.

SIGNIFICANT

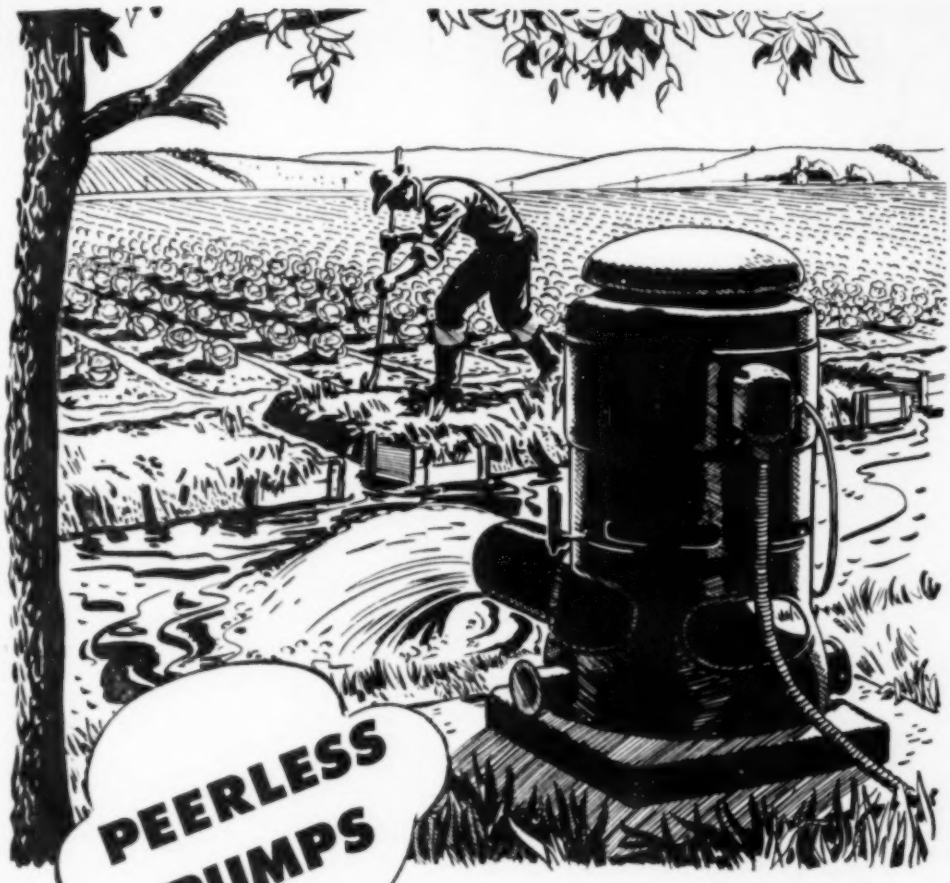
PHYSICAL METHODS OF ORGANIC CHEMISTRY. VOL. I. *Edited by Arnold Weissberger. Published by Interscience Publishers, New York. 736 pages. Price $8.50.*

Reviewed by G. F. Kinney

THIS work is a significant contribution to the field of organic chemistry. It is an authoritative presentation of theoretical background necessary to understand and evaluate experimental results, and deals with those physical tests that have proved of most value to the organic chemist. As a compilation of information it should save a research worker both time and trouble, and may well become a standby for the graduate student in organic chemistry.

Vol. I of a proposed two volume set includes 16 chapters by a series of authors. The first chapter, on melting and freezing points, (Skau and Wakeham, 46 pages) is a straightforward summary of the theory and technique of this important tool and its use in identification, determination of purity, and of molecular weight. The second chapter, on boiling points, (Swietoslawski, 21 pages) is based on that author's monograph. The chapter on density (Bauer, 38 pages) includes an evaluation of various methods and precautions necessary in their use. The short chapters on solubility (Vold and Vold, 27 pages) and viscosity (Mark, 13 pages) are followed by a chapter on surface tension (Harkins, 53 pages) and the parachor (Thomson, 8 pages) which describes the historical errors of surface tension work, and presents a critical study of modern methods and an evaluation of the parachor and its utility. A chapter on monolayers (Harkins, 42 pages) describes these interesting "two dimensional gases," and is followed by chapters on osmotic pressure (Wagner, 24 pages) and diffusivity (Geddes, 34 pages). A lengthy chapter on calorimetry (Sturtevant, 124 pages) describes the techniques of this exacting field and gives a general discussion of meauring heat of combustion, heat of fusion, heats of solution, dilution, mixing, etc.

The chapter on microscopy (Jelley, 96 pages) describes this frequently neglected tool and its uses such as limiting the number of "possibles" in identifying an unknown, checking the purity of a preparation, or checking the results obtained by other means. The next three chapters, on crystal form (Peacock, 29 pages), crystallochemical analysis (Donnay, 23 pages), and X-ray diffraction (Fankuchen, 36 pages) are outstanding. They present a lucid account of this field of growing importance, and contain information not readily obtainable elsewhere as an integrated whole. These chapters will be welcome not only in the field of organic



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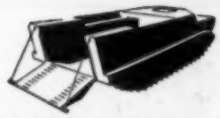

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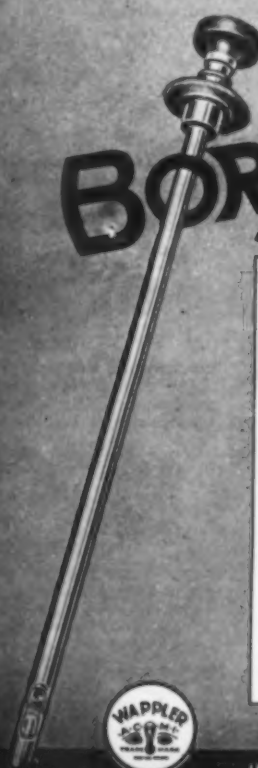

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chemistry but also in others such as metallurgy and mineralogy. The chapter on electron diffraction (Brockway, 32 pages) describes the technique of diffraction photographs, their interpretation, and a summary of the information they might give. The final chapter, on refractometry, (Bauer and Fajans, 84 pages) describes the instruments and methods of measuring index of refraction.

Both specific and general references are given throughout the book, adding to its value. For a first printing of such a work, it is relatively free from errors. Format, in accord with wartime regulations, is quite satisfactory.

No index is included, this is scheduled for Vol. II.

ELEMENTARY PRESENTATION

SOLVENTS. *Fifth edition. By Thomas H. Durrans. Published by D. Van Nostrand Co., New York. 202 pages. Price $6.*

Reviewed by Donald F. Othmer

THIS is the fifth edition of this British handbook and continues a presentation of the subject from the British industrial viewpoint. The general arrangement is good with a first part having a discussion of the theory and practice of solvent action and of the several relevant physical properties of solvents, and a second part classifying the solvents and discussing their properties and uses in detail. The data on properties are well presented and have been carefully checked. Here and there odd differences between British and American practices are indicated. Some of the material in the earlier chapters on physical chemical properties seems hardly to have kept up with the technical literature of the last ten years, but by and large it represents a good elementary presentation.

BROAD SCOPE

INDUSTRIAL ORGANIZATION AND MANAGEMENT. *By Lawrence L. Bethel, Franklin S. Atwater, George H. E. Smith, and Harvey A. Stackman, Jr. Published by McGraw-Hill Book Co., New York. 798 pages. Price $4.50.*

Reviewed by Chaplin Tyler

THIS book of nearly 800 pages is a unit of the McGraw-Hill Industrial Organization and Management Series. The authors are in the respective order of their listing, Director, New Haven Y.M.C.A. Junior College; Production Engineer, Fafnir Bearing Co.; Lawyer and Economist; and Personnel Administrator, Scoville Manufacturing Co.

The book covers an extremely broad scope and is divided into four major sections entitled "American Industry," "Organization of the Industrial Enterprise," "Operation of the Industrial Enterprise," and "Coordination of the Industrial Enterprise." There are 29 individual chapter headings, covering virtually the entire range of general management functions, including financing, research, production, industrial relations, personnel management, sales control, advertising and sales promotion, office and accounting control. To the reviewer, the meat of the book—

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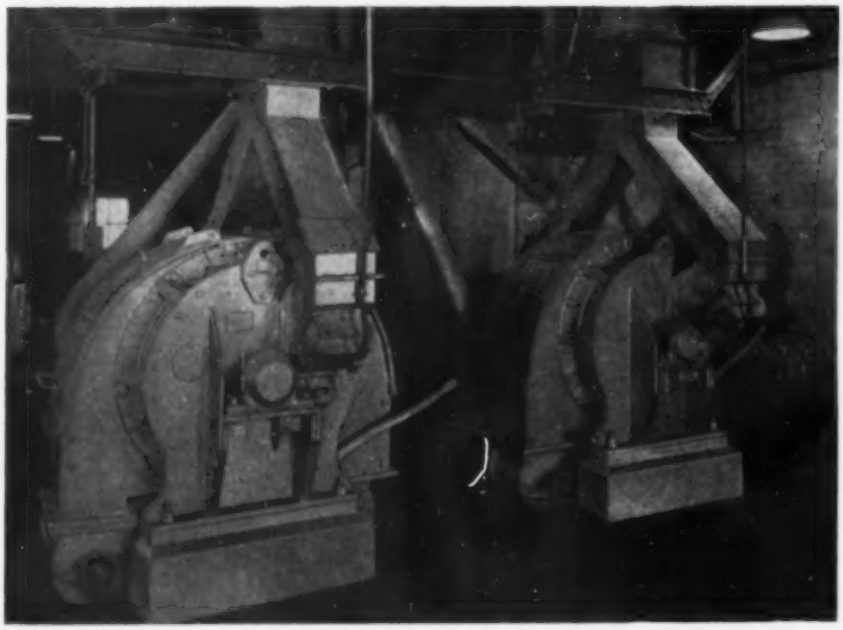

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and meat that is exceedingly well done—is in pp. 233-619 of the third section which deals with manufacturing management and industrial relations. The rest of the book is generally good, but does not seem to have so much unity of thought, punch and authority.

Only in a few spots are the soundness and balance of the text question. For instance, the discussion of common stock on p. 35 contains the following unsupported generalization: ". . . in late years the manipulation of securities and abuses in corporate management have cast some doubt upon the advantages of common stockholding." And on p. 159 considerable emphasis is given alleged abuses under the American patent system without citing any evidence and without bringing out the generally acknowledged merits of that system. However, these passages were only minor irritants encountered in the course of much enjoyable exploration of the book.

BOILING POINTS

EBULLIOMETRIC MEASUREMENTS. *By W. Swietoslawski. Published by Reinhold Publishing Corp., New York. 228 pages. Price $4.*

Reviewed by F. C. Nachod

THOSE who are familiar with the author's earlier work, "Ebulliometry, the Physical Chemistry of Distillation" (Chemical Publishing Co., 1937) will find little similarity in the present text. A great deal of new material has been added to bring the book up to date, and new techniques and apparatus have been described. Profuse illustrations help the reader to envisage the various designs. A total of 18 chapters are devoted to theory and praxis of ebulliometry and the various types of apparatus employed. Actually, this treatise is not only a text book, or a reference work, but also a well-written laboratory manual.

All who do work or carry out research in distillation and physical properties of liquids and liquid systems would do well to have a copy of Dr. Swietoslawski's treatise on their bookshelves.

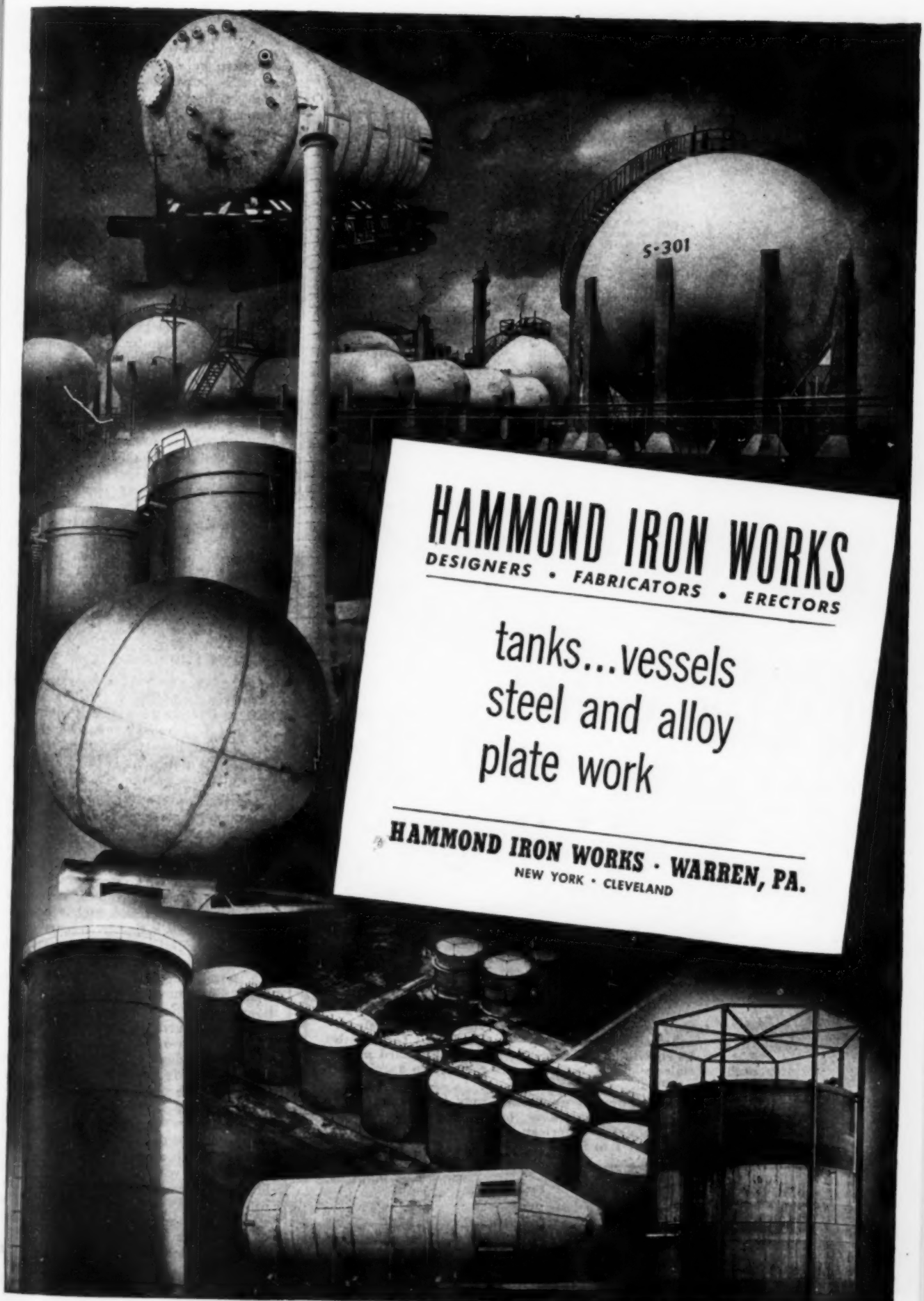
ETHYNE

THE CHEMISTRY OF ACETYLENE. *By J. A. Nieuwland and P. R. Vogt. Published by Reinhold Publishing Corp., New York. 219 pages. Price $4.*

Reviewed by W. Paul Moeller

IT IS certainly apropos to have a treatise on acetylene at this time when those interested in this subject have been afforded the opportunity of reviewing the extensive German technology of this material. The authors have given a reasonably complete account of the field of acetylene chemistry. Generally they have covered a subject in an abridged way, but their excellent classified bibliography gives the reader an opportunity of delving deeply into almost any phase of the preparation, properties or reactions without the need for a further extensive literature search.

The reviewer was especially impressed with the chapter on the polymerization of acetylene and condensation with carbon compounds, here many of the phases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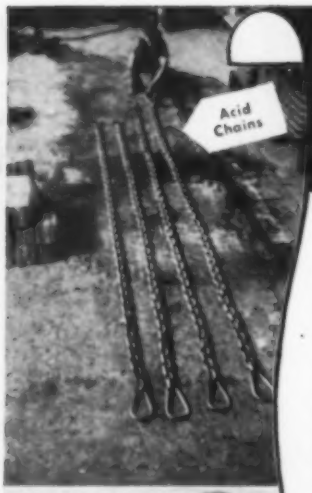

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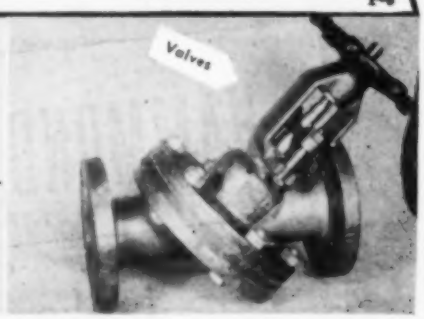

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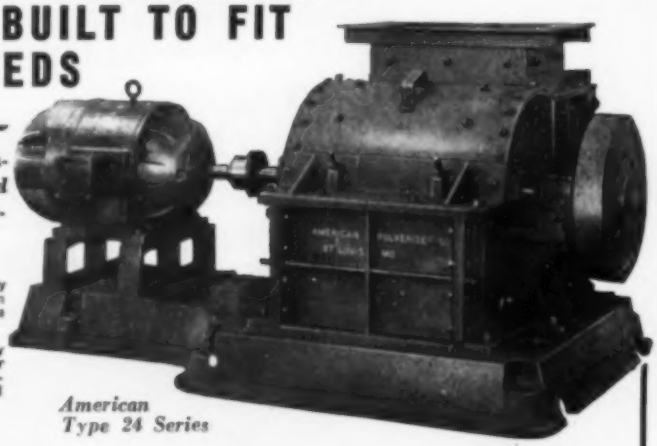

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of the chemistry, which became standard production procedures in Germany during the war and went far in giving them self-sufficiency, are discussed. It is believed that the bibliography and the wide scope of subjects discussed will make this book a welcome addition to all those interested in this subject.

TRICHROMATICS

THE MEASUREMENT OF COLOUR. *By W. D. Wright. Published by Adam Hilger, Ltd., 96 St. Pancras Way, Camden Road, London, N.W.1. 223 pages. Price 30s.*

IN SOME of our industries—paint, paper and petroleum, for example—the measurement of color is of some importance. This text, therefore, will be of interest to scientists in these industries. Its main purpose is to describe principles, methods and applications of the trichromatic system. The discussion develops from radiation in the visible spectrum, (emission, absorption and reflection), through reception in the eye, to the trichromatic system of color measurement and colorimeters, both visual and photoelectric. There are also chapters on spectrophotometry applied to color measurement, the color atlas as a substandard, and practical applications. Physical chemists, physicists and chemical engineers (but not artists) seriously concerned with electromagnetic radiations of wavelength between 0.4×10^{-3} and 0.75×10^{-3} mm. need and will appreciate Dr. Wright's contribution.

GERMAN FIBERS

CONTINUOUS AND STAPLE FIBRE PLANTS OF GERMANY. *By J. H. Givens, E. Higgs, L. L. Leach and A. R. Urquhart. Report 377, available from Office of the Publication Board, Department of Commerce, Washington, D. C. 224 pages. Price $2.*

AMONG the recently released reports on German industry (see pp. 206 & 220) is this one on the rayon and other fiber plants of our erstwhile enemy. The CIOS mission comprised one American and four British representatives. They inspected 25 plants. All but three were shut down, and all but eight were damaged more or less seriously, either by war or incendiary revenge of enslaved labor. But in spite of damage, lost records and technical personnel either missing or suffering from poor memory, the Allied investigators brought back information that will be of tremendous interest to chemical engineers in this country.

There are two main parts to the report. The first is a digest of information, treated by processes. It is a general survey covering cellulose acetate cuprammonium, viscose, synthetic Perlon fibers, and the Pe Ce processes. "Germany's production of fibers made from chlorinated polyvinyl chloride had increased . . . to about 4,000,000 lb. per year, and its production of bristles (polyvinyl chloride not after-chlorinated) to 1,500,000 lb." Also included is a long tabulation of relative characteristics of German fibers as of 1943.

It is the last part (pp. 19-224), giving descriptions of individual works and processes, that will prove to be of greatest

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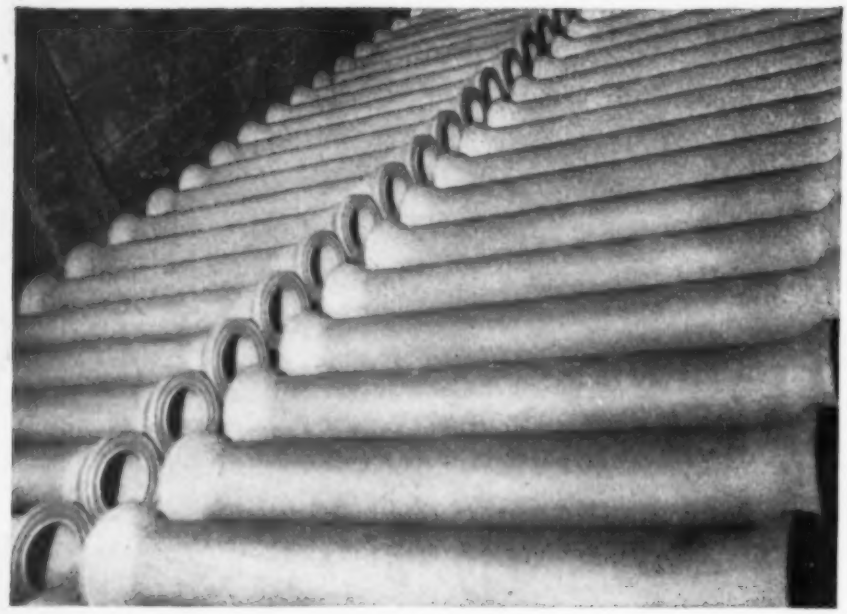

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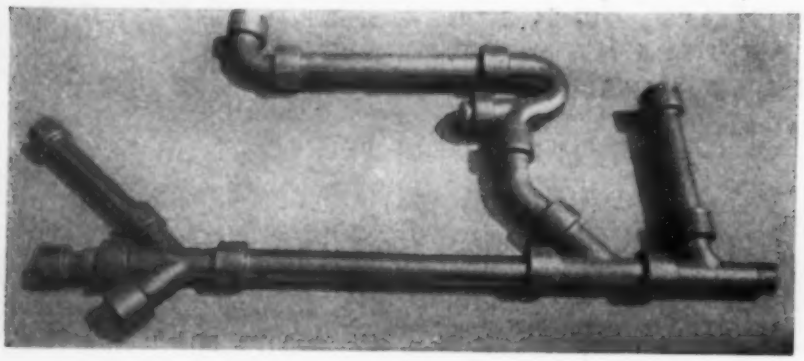


value and interest. Here each plant is treated individually. As much as the investigators were able to learn is given: date of visit, personnel interviewed, number of workers, products and capacities, raw materials, equipment, processes and operating data. Many illustrations, flowsheets and reproductions of blueprints help to clarify the descriptions. The type of information makes it easy for the reviewer to succumb to the temptation to quote in order to emphasize the completeness with which our investigators did their job: "The pulp, either beech or spruce, is steeped in 18% caustic soda solution containing 2% hemi-cellulose for 2 hours at 18° C. in batches of 300 kg., pressed to 990 kg. and unloaded from the end of the press, through the floor, direct to the pfleiderers below, where the alkali cellulose from beech pulp is shredded for 60 minutes, and that from spruce 90 minutes."

RECENT BOOKS and PAMPHLETS

Technical Association Papers. 28th series. Edited by R. G. Macdonald and R. T. Bingham. Published by Technical Association of the Pulp and Paper Industry, 122 East 42nd St., New York 17, N. Y. 592 pages. Papers and addresses presented (by title) before the Technical Association of the Pulp and Paper Industry.

Sugar and Sugar By-Products in the Plastics Industry. By Louis Long, Jr. Scientific report series No. 100, by Sugar Research Foundation, Inc., New York. 61 pages. Sucrose, derivatives and byproducts of its manufacture.

Chemical Literature. By Gustav Egloff and others. Booklet No. 259, published by Universal Oil Products Co., 310 So. Michigan Ave., Chicago. 41 pages. Three articles reprinted from *Journal of Chemical Education*: "Problems of the Scientific Literature Survey," "Problems of Scientific Literature Research," and "Scholastic Training for Chemical Literature Research."

The Plastics Industry. Published by Plastics Materials Manufacturers' Association, Tower Building, 14th and K Sts., NW, Washington 5, D. C. 14 pages. Pamphlet prepared to help clear up a number of misconceptions about the possibilities of plastics.

War Production in 1944. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 142 pages. Price 25 cents. Report of the chairman of the War Production Board.

Pulp and Paper Manufacture, Bibliography and United States Patents, 1944. Compiled by C. J. West. Published by Technical Association of the Pulp and Paper Industry, 122 E. 42nd St., New York 17, N. Y. 221 pages. Literature on pulp and paper manufacture published during the year 1944 with references for earlier years which were not available when the Bibliography for 1943 went to press.

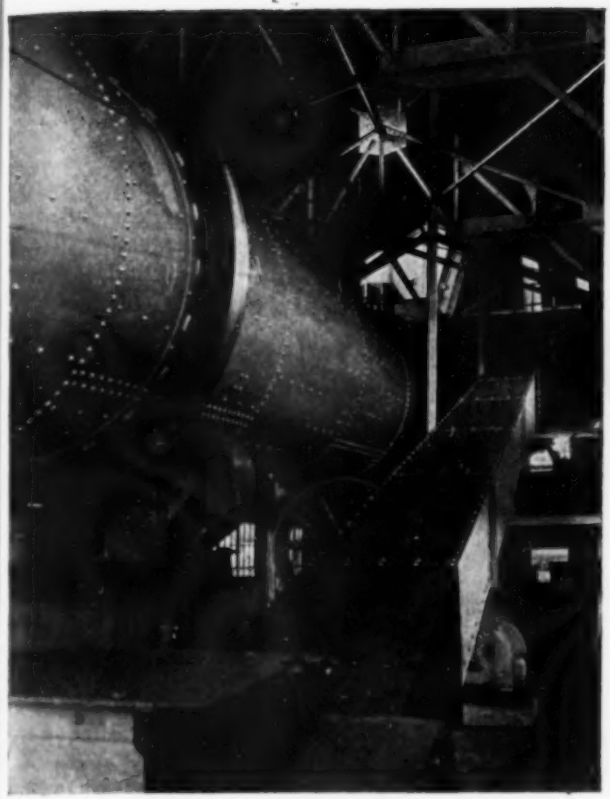
ASTM Standards on Soaps and Other Detergents. Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. 183 pages. Price $1.75. Special compilation of specifications and tests. Includes a 30-page bibliography on metal cleaning.

Resources of Whatcom County, Washington. Published by the Bellingham Chamber of Commerce, Bellingham, Wash. 56 pages. Industrial markets, transportation, forest products, minerals, power, water and other facilities or resources of Bellingham and Whatcom County. Includes a section on taxes and availability of industrial sites. Statistics, maps and charts.

The Art and Science of Crop Feeding. By C. J. Brand and H. R. Smalley. 10 pages. Reprinted from *The Scientific Monthly*.

The Fertilizer Review, 1943-44. Published by The National Fertilizer Association, 616 Investment Building, Washington 5, D. C. Bound volume of 1943 and 1944 issues.

Classification of Plastics Molding Materials. Published by the Society of the Plastics Industry, 295 Madison Ave., New York 17, N. Y. 12



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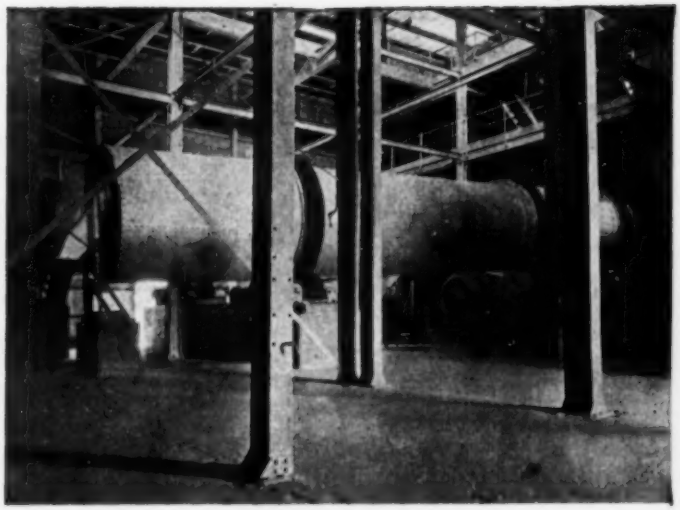

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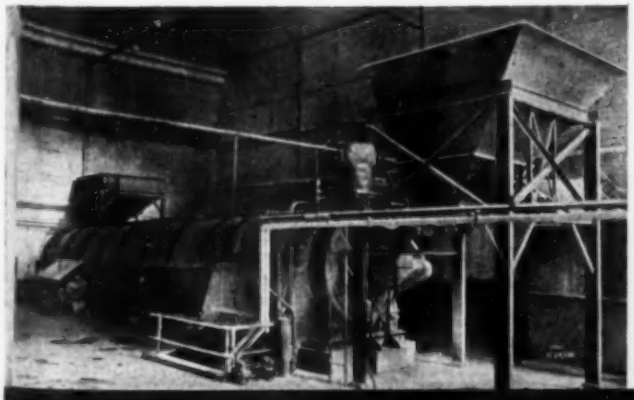

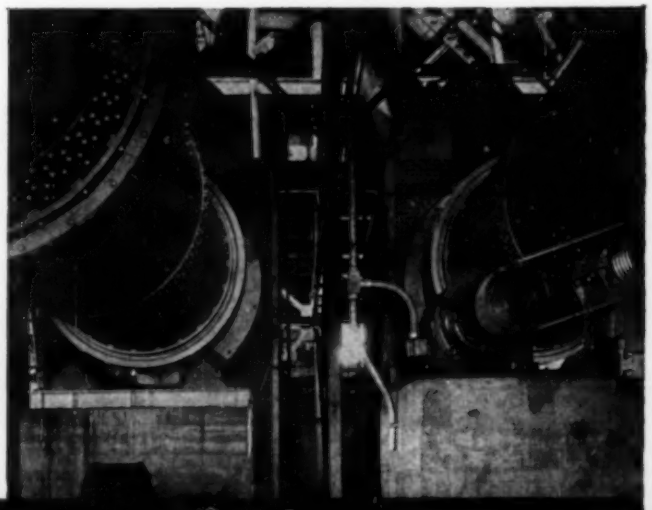

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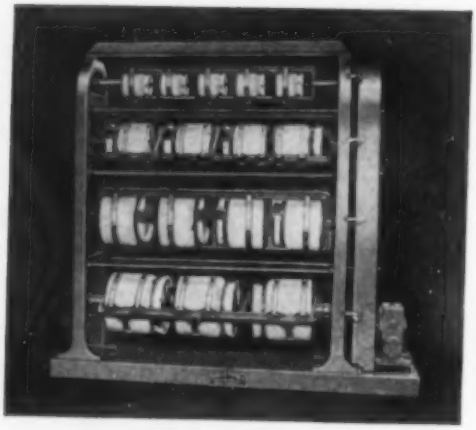

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pages. First of several chapters later to be published in a SPI Handbook.

Gyps and Swindles. By W. T. Foster. Pamphlet No. 109, published by Public Affairs Committee, 30 Rockefeller Plaza, New York 20, N. Y. 31 pages. Price 10 cents. A warning to veterans and others.

Code of Minimum Requirements for Instruction of Welding Operators: Part A. Arc Welding of Steel, 3/16 to 3/4 In. Thick. Published by American Welding Society, 33 West 39th St., New York, N. Y. 83 pages. Price 50 cents. Equipment, facilities, exercises, topics for lectures and discussion.

Aluminum Bulletin. Published by The Aluminum Association, 420 Lexington Ave., New York 17, N. Y. 8 pages. Volume 1, No. 1 of a new quarterly publication.

Table of Arc Sin X. Published by Columbia University Press, New York, N. Y. 124 pages. Price $3.50. Table of 12-place values of arc sin x in radians.

Directory, 1945. Compiled by Ruth A. White. Published by Engineering College Research Association, Austin 12, Tex. 92 pages. A directory of member institutions and their fields of research.

Ball and Roller Bearing Engineering. By A. Palmgren, translated by G. Palmgren and B. Ruley. Published by SKF Industries, Inc., Front St. and Erie Ave., Philadelphia 34, Pa. 270 pages. A fundamental text, neither treatise nor catalog, written by a recognized authority in the field.

Soviet Far East and the Pacific Northwest. By the University of Washington, Bureau of Business Research of the College of Economics and Business. Published by the University of Washington Press, Seattle 5, Wash. Price $1. Symposium dealing with basic Soviet economy, foreign policy in the Pacific, possibilities of postwar cooperation, trans-Pacific trade routes, sites of Soviet mineral deposits, Siberian railroads and port facilities.

Economic Base for Power Markets in Clallam and Jefferson Counties, Washington. By the Bonneville Power Administration, Portland, Ore. An economic survey of the northern end of the Olympic peninsula, Washington, stressing natural resources and how these can be used to create new industries. Discusses wood byproduct utilization and chemical industries.

Research for Industry. Published by Pacific Research Foundation, 417 S. Hill St., Los Angeles 13, Calif. 10 pages. Brochure that discusses briefly the objectives and purposes of this non-profit research organization now in the process of being organized.

Economics of Industrial Alcohol. By Rayburn D. Tousley. Bulletin 3, published by the Bureau of Economic and Business Research, State College of Washington, Pullman, Wash. 69 pages. Study on the economic feasibility of developing an industrial alcohol industry in the Pacific Northwest. Considers the national as well as regional aspects of prewar status of the industrial alcohol industry, wartime changes in production and consumption, price trends, prospective postwar production costs from different raw materials, prospective postwar supply and demand, and prospects for an alcohol industry in the Pacific Northwest.

Light Metals. Published by Light Metals Advisory Committee, State College of Washington, Pullman, Wash. 24 pages. Outlines the facilities and program for light metals research at this university. Summarizes briefly accomplishments to date on projects involving ore beneficiation, chemical processing and metal fabrication.

Let's Look at Portland, Pacific Port of Industrial Opportunity. Published by Industries Dept., Portland Chamber of Commerce, 824 S. W. Fifth Avenue, Portland 4, Ore. 50 pages. Natural resources of the region, water supply, power facilities, transportation, manufacturing activities by industries, and labor supply. Contains type of information of interest to engineers and industrialists.

Publications. Published by Western Regional Research Laboratory, Albany 6, Calif. A 17-page mimeographed form listing selected publications available on request that deal with the research activities in food processing and by-product utilization of this laboratory.

California Minerals. By Henry H. Symons. Bulletin 128, published by Division of Mines, California Department of Natural Resources, Ferry Bldg., San Francisco, Calif. 222 pages. Price 75 cents. Detailed statistics on production of minerals in the state of California for 1943. Summarizes mining activity by indi-

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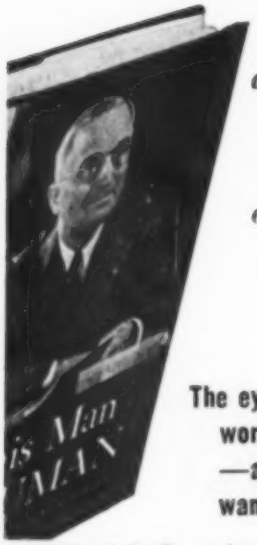

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vidual minerals and lists each producer of each mineral commodity for the year. Also summarizes mineral production by counties.

Directory of Manufacturers in Contra Costa County, Calif. Compiled and published by the Contra Costa County Development Ass'n., 337 Tenth Street, Richmond, Calif. 43 Pages. Mimeographed compilation of manufacturers in each of the towns of Contra Costa County, Calif. Gives condensed information on each producer. Also contains an alphabetical listing of products with producers of each.

Publications Catalog. Published by University of California Press, Berkeley 4, Calif. 28 pages. The 1945 catalog and price list of new scientific, language and other publications issued by the University of California press.

Nevada Geology. Published by Nevada State Bureau of Mines, University Station, Reno, Nev. Bulletin 42. Price 25 cents. A geology and mining series bulletin giving the geology of the Groon District of Nevada.

Flax. Published by Oregon Flax & Linen Board, 2605 State Street, Salem, Ore. A folder that describes briefly and illustrates the growing, harvesting and processing of flax into tow and fibers. Gives some statistics on Oregon's flax industry.

Oregon Coal. Published by Oregon State Dept. of Geology and Mineral Industries, 702 Woodlark Bldg., Portland 5, Ore. 160 Pages. Price $1. Geology and coal reserves of the Coos Bay quadrangle in Oregon. Gives a detailed description of the geology of the region and results of exploration of 1,000 acres by shallow drilling.

Economic Mineral Resources and Production of California. Bulletin 130, published by Division of Mines, California State Department of Natural Resources, Ferry Building, San Francisco 11, Calif. 455 pages. Price $2. Reviews production and past yield of the 60 industrial minerals produced in California and estimates reserve and future potentialities of their utilization. Potentialities are considered in terms of postwar employment in California industry. Includes a chapter on the chemical industry as a consumer of California minerals. Contains a complete list of California producers of commercial minerals by commodities, operators, and county location. Extensive tables giving breakdown of yearly production of minerals by counties for over 40 years.

Los Angeles. Published by Research Dept., Los Angeles Chamber of Commerce, Los Angeles, Calif. Vest-pocket booklet giving yearly statistics since 1910 in table and chart form on population, bank debits, resources and agriculture, manufacturing, building permits, general business activity and other facts about the city and county of Los Angeles. Intended for business men, industrialists, professional men, and others desiring a summary of information pertaining to the region.

GOVERNMENT PUBLICATIONS

The following recently issued publications are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering any publication noted in this list always give the complete title and the issuing office. Remittances should be made by postal money order, coupons, or check. Do not send postage stamps. All publications are in paper covers unless otherwise specified. When no price is indicated, the pamphlet is free and should be ordered from the bureau responsible for its issue.

Cigarette Paper. Tariff Commission. War Changes in Industry Series Report No. 11. Price 10 cents.

Refractory Magnesia (Magnesite). Tariff Commission. War Changes in Industry Series Report No. 12. Price 15 cents.

Synthetic Organic Chemicals, United States Production and Sales, 1944. Tariff Commission. Mimeographed.

The Castor-Bean Plant as a Source of Insecticides. A Review of the Literature. By N. E. McIndoo. Bureau of Entomology and Plant Quarantine, E-666. Mimeographed.

The Deterioration of Cotton Fabric by Certain Micro-Organisms. By Dorothea E. Klemme and others. Department of Agriculture, Circular No. 737. Price 5 cents.

The Cumulative Supplement to the Code of Federal Regulations, June 2, 1938 to June 1, 1943. Book 1. Price $3.

National Directory of Commodity Specifications 1945. By Paul A. Cooley. Bureau of Standards. Miscellaneous Publication M178. Price $4.

Instructions for the Operation and Maintenance of Pumps. Bureau of Ships Manual, Chapter 47. Price 20 cents.

Design of Injectors for Low Pressure Air Flow. Bureau of Mines, Technical Paper 678. Price 10 cents.

Dust-Counting Cells. By Carlton E. Brown, R. L. Beatty, and T. B. Kirby. Bureau of Mines, Information Circular I. C. 7331. Mimeographed.

Tank-Mounted Air Compressors, 1945. Bureau of Standards, Commercial Standard 126. Price 10 cents.

Traffic in Opium and Other Dangerous Drugs for the Year Ended December 31, 1944. Narcotics Bureau. Price 15 cents.

Summary Report, German Synthetic Rubber Mechanical Goods. War Production Board. Price 10 cents.

Social Impact of Science, Select Bibliography; with Section on Atomic Power. Subcommittee on War Mobilization of the Committee on Military Affairs, Senate. Senate Subcommittee Monograph No. 3. Price 15 cents.

Organization of the Department of State, April 1, 1945. State Department. Price 40 cents.

Resins in Coal. By W. A. Selvig. Bureau of Mines, Technical Paper 680. Price 10 cents.

Relative Spontaneous Heating Tendencies of Coals. By J. L. Elder, and others. Bureau of Mines, Technical Paper 681. Price 10 cents.

Magnetometer Surveys on Black Sands of the Oregon Coast. By E. L. Stephenson. Bureau of Mines, Report of Investigations R. I. 3814. Mimeographed.

Processes for Making Barium and Its Alloys. By W. J. Kroll. Bureau of Mines, Information Circular I. C. 7327. Mimeographed.

Rural Water-Supply Sanitation. Recommendations of the Joint Committee on Rural Sanitation. Public Health Service. Supplement No. 185 to the Public Health Reports. Price 10 cents.

Developments in Consumers' Cooperative Movement in 1944. Bureau of Labor Statistics. Bulletin No. 821. Price 10 cents.

Mineral Trade Notes. The Bureau of Mines beginning in July has resumed issuing this document which is a monthly inventory of information from U. S. Government Foreign Services offices and other sources that may not otherwise be made available promptly. Those desiring to receive the material regularly should request their names be put on the mailing list.

Three Keys to Reconversion. Fourth report to the President, the Senate and the House of Representatives by the Director of War Mobilization and Reconversion. Bureau of Special Services, Bureau of the Budget, 1400 Pennsylvania Avenue N. W., Washington 25, D. C.

Production of Manufactured Dairy Products, 1944 (preliminary). Bureau of Agricultural Economics. Mimeographed.

Federal Specifications. New or revised specifications which make up Federal Standard Stock Catalog have been issued on the following items: Drums; Steel, Type 5B (for Liquid Petroleum Products) RR-D-729a. Thinner; Paint, Volatile Mineral Spirits (Petroleum Spirits) TT-T-291a. Oil; Cutting, Mineral-Fatty-Oil-Blend VV-O-251a. Soda-Ash O-S-571b.

Hearings on Science Legislation before Senate Subcommittee of the Committee on Military Affairs. These minutes record statements by those in favor and those criticizing the establishment of the National Research Foundation. They should be ready for distribution by the end of the year, perhaps sooner, from the Subcommittee on War Mobilization.

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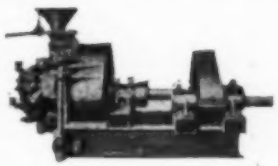

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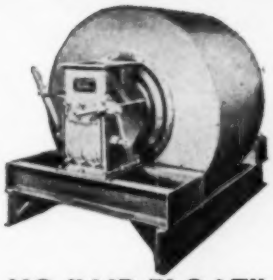

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MANUFACTURERS' LATEST PUBLICATIONS

Publications listed here are available from the manufacturers themselves, without cost unless a price is specifically mentioned. To limit the circulation of their literature to responsible engineers, production men and industrial executives, manufacturers usually specify that requests be made on business letterheads.

Air Conditioning. W. B. Connor Engineering Corp., 114 E. 32nd St., New York 16, N. Y.—12-page folder covering the savings of fuel, energy and equipment where this company's air recovery system is installed.

Alloys. Olds Alloys Co., 8686 Rheem Ave., South Gate, Calif.—8-page booklet describing and illustrating the line of bronze alloys put out by this firm and their industrial uses. Includes engineering data on physical characteristics.

Alloy Steels. The Carpenter Steel Co., Reading, Pa.—16-page booklet featuring the application of "tailormade" alloy steels for various purposes.

Boilers. Springfield Boiler Co., Springfield, Ill.—Catalog No. 35-A. 32-page booklet describing the all steel sectional water tube boilers built by this company. Features of design together with illustrations of a large number of applications and installations are included. Also contains a section on the rules for care and operation of power boilers.

Beryllium. The Brush Beryllium Co., 3714 Chester Ave., Cleveland 14, Ohio—2-page leaflet giving information on the advantages and applications of beryllium in the manufacture of various products.

Cellulose Acetate. Hercules Powder Co., Wilmington, Del.—36-page booklet featuring cellulose acetate and including comprehensive information on manufacture of this product together with its chemical and physical properties. The various uses of this material in a number of different products and industries are described.

Coatings. American Pipe Construction Co., Box 3428, Terminal Annex, Los Angeles, Calif.—16-page booklet illustrating and describing various applications for Amercoat, a plastic coating material for corrosion protection and contamination protection of equipment in various industries.

Detergents. The Solvay Process Co., 40 Rector St., New York 6, N. Y.—8-page leaflet describing this company's new organic detergent known as Nytron. Chemical and physical properties together with a discussion of applications are included.

Diesel Engine Overhauling. Turco Products, Inc., 6135 South Central Ave., Los Angeles 1, Calif.—8-page illustrated booklet describing specific details of chemical methods for removing carbon, grease, oil and asphalt from diesel engines; de-scaling cooling systems; removing and preventing rust; removing old paint; preparing metal for bonds.

Electric Controls. United Electric Controls Co., 69-71 A St., Boston 27, Mass.—Catalog 4591-C. 12-page condensed catalog describing this company's electric thermostats and pressure switches. Models, specifications, performance data, and prices are tabulated.

Engineering Construction. Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 11, Calif.—8-page bulletin discussing briefly and illustrating the growth of this firm of industrial engineers and constructors during the past 30 years and the types of services and installations now offered to industry.

Equipment. Littleford Bros. Inc., 457 E. Pearl St., Cincinnati 2, Ohio—24-page booklet illustrating the various types of equipment fabricated by this company from plate and sheet steel. Many types of equipment are shown including tanks, housings, instrument mounting structures, mixing vessels, machine guards, hoppers, ducts, troughs, wagons, and other miscellaneous equipment.

Filters. R. P. Adams Co., Inc., 55 Chicago St., Buffalo, N. Y.—Bulletin No. 675. 4-page leaflet describing the TF water filter manufactured by this firm. Contains specifications, prices and data on various types of operations. The principle of operation is illustrated by multi-color diagrams and a typical hook-up giving general dimensions and piping arrangements is shown.

Filters. Filtros Inc., East Rochester, N. Y.—32-page booklet featuring Filtros, a porous mineral filter media. Physical and chemical properties are discussed and shapes and sizes of these filter media are illustrated.

Flexible Shafting. Stow Mfg. Co., Binghamton, N. Y.—Book 645C. 36-page illustrated booklet describing the use of flexible shafting for the remote control of valves. Contains data on selection, installation, and maintenance.

Floor Cleaner. L. Sonneborn Sons, Inc., 88 Lexington Ave., New York 16, N. Y.—4-page illustrated booklet describing Floorlife cleaner which not only cleans floors but waxes them as well. Removes dirt readily from all types of wood and linoleum floors.

Friction Sawing. The DoAll Co., 1301 Washington Ave., So., Minneapolis 4, Minn.—24-page illustrated booklet describing friction sawing and how it is applied to various materials including plastics.

Gas Purification. Baker & Co., Inc., 113 Astor St., Newark 5, N. J.—4-page leaflet featuring Deoxo gas purifier, for hydrogen, oxygen, nitrogen, argon, neon, helium, etc.

Glassworking Machines. Litton Engineering Laboratories, Redwood City, Calif.—24-page folder that illustrates and describes the line of glassworking lathes and attachments, sealing machines, burners, vacuum pumps, vacuum tube parts and related equipment put out by this firm. Includes specification data and prices.

Gold Plating. Baker & Co., Inc., 113 Astor St., Newark, N. J.—12-page booklet describing gold plating methods including information on equipment, plating salts, and the optimum operating conditions for each type of plating.

Heat Transfer Equipment. Davis Engineering Corp., Elizabeth, N. J.—A bound volume of separate catalogs covering the heat transfer equipment made by this company. Included are catalogs illustrating and describing water heaters, preheaters, condensation coolers, feed water heaters, fuel oil heaters, heat exchangers, evaporators, distillation units, etc.

Hose. Hewitt Rubber Corp., Buffalo, N. Y.—A new catalog is now available describing the revised and improved line of industrial hose manufactured by this company.

Hydrides. Metal Hydrides, Inc., Beverly, Mass.—20-page booklet describing the hydride process and its products. A number of the metal hydrides produced by this company by this process are discussed in detail and include the hydrides of titanium, zirconium and other metals and alloys.

Hydraulic Pumps. Pesco Products Co., 11610 Euclid Ave., Cleveland 6, Ohio—Bulletin No. 101. 2-page leaflet featuring the high pressure gear pumps built by this company. Performance data are included together with installation diagrams.

Industrial Equipment. Precision Equipment Co., 32 No. State St., Chicago, Ill.—An industrial buyers' bulletin listing equipment ordinarily difficult to obtain but which this company has in stock for immediate delivery. Price lists.

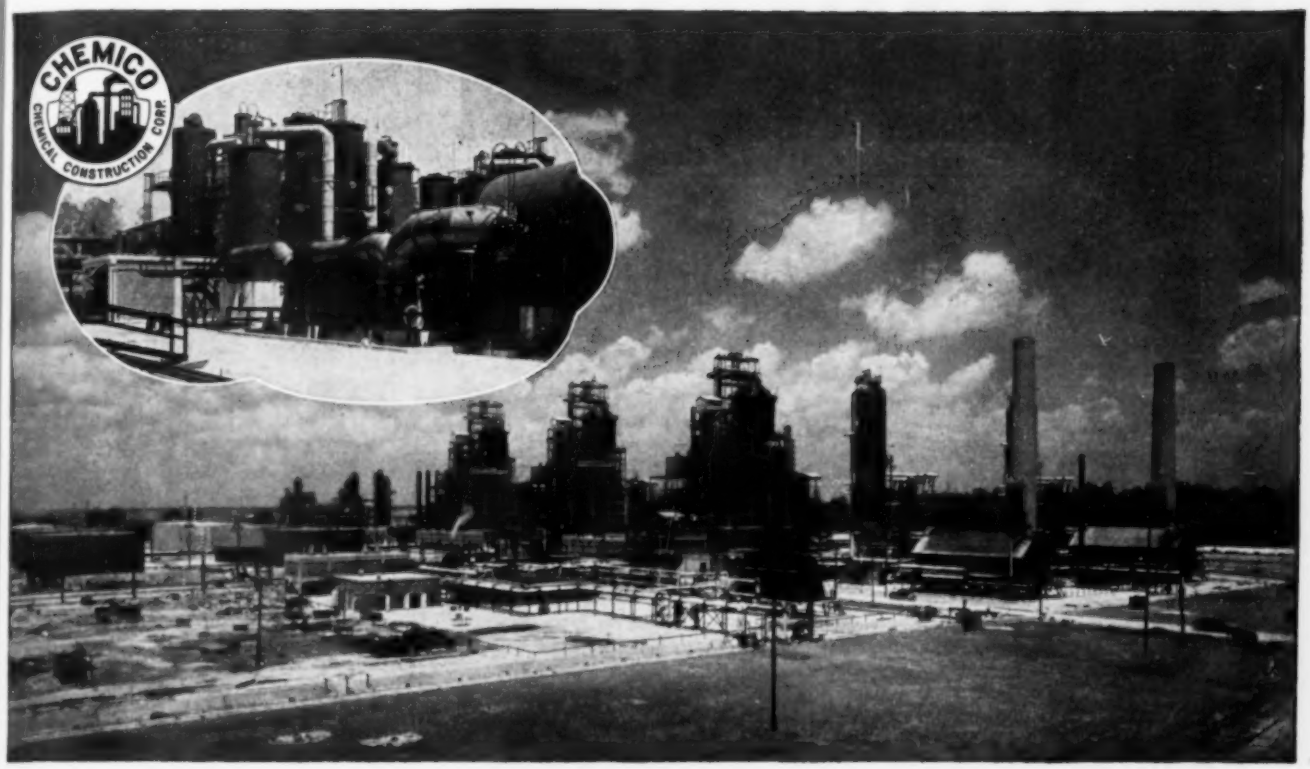
Instruments. American Meter Co., 60 E. 42nd St., New York 17, N. Y.—Bulletin E-24. 14-page booklet featuring this company's reset controller. The various components of this instrument are well illustrated to show the principles of operation.

Instruments. The Applied Research Laboratories, Glendale, Calif. and the Harry W. Dietert Co., 9330 Roselawn, Detroit 4, Mich.—4-page leaflet describing the features of the two-meter spectrograph built by these two companies.

Instruments. Askania Regulator Co., 1603 So. Michigan Ave., Chicago 16, Ill.—Bulletin 124. 12-page illustrated booklet describing automatic controls for the glass industry. Detailed discussions of the control of furnace pressure, combustion, heat input, and automatic reversal are given. A complete schematic view of a glass furnace is shown. Bulletin 126. 4-page leaflet featuring this company's crank type cylinders for application of hydraulic power.

Instruments. Fischer & Porter Co., Hatboro, Pa.—Bulletins 82-A and 83-A. Two data sheets describing the Rota-sleeve, a new type of rotameter for handling large flows of liquids and gases. Tables of dimensions, sizes and capacities are included.

Instruments. North American Phillips Co., Inc., 100 E. 42nd St., New York 17, N. Y.—16-page reprint entitled "X-Ray Diffraction, Basic Theory, Principles and Applications." Also a 4-page reprint entitled "Use of Low Angle



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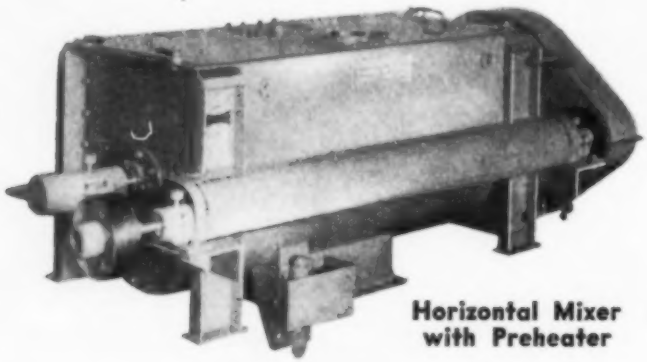

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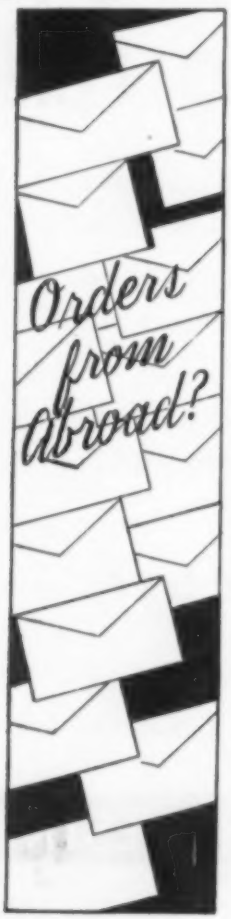

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X-Ray Scattering in the Study of Catalysts, Viruses and Other Materials."

Instruments. Republic Flow Meter Co., 2240 Diversey Parkway, Chicago 47, Ill.—Data Book No. 1000. 28-page booklet featuring pneumatic transmission instruments. Contains a comprehensive and well illustrated presentation of the force-balance principle and shows the construction and operation of various types of pneumatic transmitters for the measurement of flow, pressure, level and density.

Instruments. W. A. Taylor & Co., 7300 York Road, Baltimore 4, Md.—38-page combination handbook and catalog containing a discussion on the application of pH, chlorine and phosphate control in a number of different industries.

Laboratory Supplies. New York Laboratory Supply Co., 78 Varick St., New York 13, N. Y. —A catalog illustrating and describing laboratory apparatus for all types of industrial, commercial and institutional laboratories.

Liquid Sulphur Dioxide. Ansul Chemical Co., Marinette, Wis.—12-page reprint describing the use of liquid sulphur dioxide in the food industries.

Materials Handling. Elwell-Parker Electric Co., Cleveland, Ohio—Booklet on industrial logistics which outlines a simple, effective method for handling materials and manufactured products economically and safely.

Oil Separators. Gale Oil Separator Co., Inc., 52 Vanderbilt Ave., New York 17, N. Y.—4-page leaflet describing this company's equipment for recovering oil from oil water mixtures and for the prevention of stream pollution. The various types of equipment are illustrated and include oil separators, neutralization equipment, interceptors, together with a table of sizes and capacities.

Packing. Flexrock Co., Filbert and Cuthbert Sts., Philadelphia 4, Pa.—10-page leaflet describing the packing materials and gaskets made by this company. The various types of packing are described briefly and are classified as to their uses.

Pipe Fittings. Bonney Forge & Tool Works, Allentown, Pa.—16-page catalog containing complete application information, structural data, installation information, specifications and list prices of WeldOlet fittings.

Plastics. Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.—8-page Plastics primer intended to clear up the confusion about plastics which is so prevalent. Physical and chemical properties of a representative group of phenolic molding materials are given in chart form.

Plastics. Watertown Mfg. Co., Echo Lake Road, Watertown, Conn.—44-page booklet discussing the plastic materials made by this company. Included is a table of the properties as well as a discussion of the various methods and techniques used in manufacturing products from these plastics.

Power Transmission. Chain Belt Co., Springfield 2, Mass.—Bulletin No. 45-1. 8-page folder describing Baldwin-Rex roller chain belt for power transmission. Features of this roller chain together with roller chain shaft couplings are discussed, and specifications showing sizes, model numbers, and list prices are given. Bulletin 455. 12-page illustrated booklet describing the chain belts and portable pumps used in oil field service. Specifications, dimensions and price lists are given.

Process Equipment. Blaw-Knox Division, Pittsburgh, Pa.—One page leaflet illustrating process equipment used in resin manufacture.

Process Equipment. The Patterson Kelly Co., Inc., East Stroudsburg, Pa.—Catalog section No. 103-K. 8-page booklet describing and illustrating the process equipment built by this company. Includes data on various types of reaction kettles, heat exchangers and special equipment made by this company.

Process Equipment. Union Iron Works, Erie, Pa.—4-page booklet describing process equipment for use in resin plants. Packaged units are available for the production of plastics, coatings, paints, varnishes, adhesives, etc.

Product Research. Hungerford Research Corp., Murray Hill, N. J.—16-page pamphlet describing the engineering services offered by this company.

Pulp Processing. Milton Roy Pumps, 1300 E. Mermaid Ave., Chestnut Hill, Philadelphia 18, Pa.—4-page reprint describing the continuous digestion of wood pulp. Technical Paper No. 52.

Pumps. The LaBour Co., Inc., Elkhart, Ind.

Jones HERRINGBONE SPEED REDUCERS

Catalog No. 70 of Jones Herringbone Reducers presents a vast amount of data relating to Herringbone Reduction Units. Illustrations show a broad range of herringbone reducer applications, and technical information shows how to select reducers for all conditions of service in accordance with the A.G.M.A. recommended practice.

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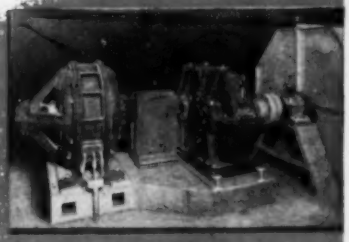

• Jones Reducer on a cement mill elevator head shaft drive.

• Double type Jones Herringbone Speed Reducer driving kiln in cement plant.

• Jones Speed Reducer on a feeder drive in cement mill.

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—Bulletin No. 51. 12-page booklet describing Type G packingless, self-priming, centrifugal pumps manufactured by this company. Principles of operation and construction features are well illustrated and described together with instructions for installation and maintenance. Types of applications together with operating information and a table of useful pumping information are included.

Reagent Feeders. Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.—Bulletin F6B6. 6-page data bulletin on this firm's line of feeders for distributing and emulsifying liquid chemicals and flotation reagents. Contains details on latest improvements, methods of adjustment, capacities and specifications.

Refined Petroleum Products. L. Sonneborn Sons, Inc., 88 Lexington Ave., New York 16, N. Y.—This company has issued a series of technical data files on specific uses of refined petroleum products for manufacturing and processing in various industrial fields. Each data file is standard size and may be used for filing all essential data on the subject of the particular file. On the front of each file are data on properties, principles and formulations, commercial preparation and suggested methods of application of individual products. Some of the subjects covered are household type insecticides, automobile and furniture emulsion polishes, cattle sprays, solvent cleaners, spray emulsions, and other similar products.

Refrigeration. Graham Mfg. Co., Inc., 415 Lexington Ave., New York 17, N. Y.—Bulletin 60. 16-page illustrated booklet describing steam vacuum refrigeration equipment produced by this company. The types of units manufactured and the industries to which they are applicable are discussed. Specifications, dimensions and capacities are given in tabular form, together with list prices.

Roofing Materials. Flexrock Co., Filbert and Cuthbert Sts., Philadelphia 4, Pa.—Leaflet describing the various types of roofing materials manufactured by this company.

Rust Remover. Service Industries, 2103 E. Somerset St., Philadelphia 34, Pa.—4-page folder describing the properties and application of Ferox, a rust removal solution and Acidulun, an acidproof plastic coating.

Silver Welding. Air Reduction Sales Co., 60 E. 40th St., New York 17, N. Y.—16-page illustrated booklet describing Silbras joints in brass or copper pipes and tubing.

Speed Control. Reeves Pulley Co., Columbus, Ind.—30-page pocket size booklet describing speed control equipment and power transmission equipment manufactured by this company.

Sponge Rubber. The Sponge Rubber Products Co., Shelton, Conn.—Form 845-21. 4-page pamphlet describing the various forms in which sponge rubber, bonded fiber and other sub-density materials are available.

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Washrooms. Bradley Wash Fountain Co., No. 22nd and West Michigan Sts., Milwaukee 1, Wis.—12-page booklet designed to aid in the planning and modernizing of washrooms in industrial plants.

Water Baths. Barnstead Still & Sterilizer Co., Inc., 2 Lanesville Terrace, Forest Hills, Boston 31, Mass.—6-page leaflet describing a low cost electrically heated water bath for laboratory use.

Vacuum Cleaners. Allen Bilmyre Co., 431 Fayette Ave., Mamaroneck, N. Y.—Bulletin F-4. 10-page bulletin illustrating and describing the portable Exidust vacuum cleaner for cleaning floors, walls, crevices, machine parts, pipes, and other structures.

Vacuum Equipment. National Research Corp., 100 Brookline Ave., Boston, Mass.—28-page brochure describing the accomplishments of this company in high vacuum industrial processes. The elements of a high vacuum system are individually described and illustrated and include diffusion pumps, condensers, vacuum valves and plumbing, vacuum gages and controls, etc. Also contains a section on the useful relations and tables in high vacuum techniques.

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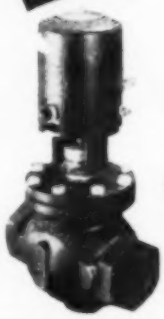

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CHEMICAL ECONOMICS

H. M. BATTERS, Market Editor

CONSUMPTION OF CHEMICALS DROPS BUT LITTLE IN FACE OF SHARP INDUSTRIAL DECLINE

BOTH PRODUCTION and consumption of chemicals have made an excellent showing since the termination of hostilities. So many unfavorable factors have arisen—such as labor disputes, strikes, delays in reconversion, dropping of lend-lease, and sudden cancellation of war contracts—that industry as a whole has taken a precipitous tumble. Total production started on a downward course last April when the pressure of military needs began to relax. The Federal Reserve Board index for all production measures month-by-month developments and shows that the earlier gradual declines gave way to sharp fluctuations by July when the number stood at 212 as compared with 221 in June and with 232 in March. The drop was still sharper in August and September with the index numbers 189 and 175 respectively.

In the face of this reversal the position of most of the industries which account for the bulk of chemical consumption did not change materially. Some of them naturally were affected by prevailing conditions but within the group, declines in one direction were largely offset by increased operations in other lines. The *Chem. & Met.* index for industrial consumption is 184.02 for September compared with a revised index of 187.07 for August. Last year the numbers for September and August were 178.84 and 186.17 respectively. In September the *Chem. & Met.* index topped the Federal Reserve Board index for all production for the first time since March 1942.

The *Chem. & Met.* index for September brings out some changes which have followed the removal of allocation controls and which permit the movement of raw materials to industry where formerly they had been going mainly into war production. This is especially noted in the case of rubber. Throughout the war period, rubber was carried at an unchanged nominal figure in the index. As September is the first full postwar month, a major part of rubber production is now accredited to industrial use. Actually the amount of rubber made available to industry was going up long before the war ended. Therefore the sharp rise in the index from August to September represents a difference of more than one month. In August production of passenger tires rose 28.2 percent over July figures and was the highest month's output since November 1941. Then, too, the rubber industry of the present differs much from what it was in the prewar era. With synthetic rubber supplying the bulk of requirements, chemicals are used to an extent out of all proportions to the standards of the prewar industry.

Plastics likewise have reached a position where most of production may be considered as for industrial use. During the war, production in general was held to be an industrial effort differing from rubber in that operations were carried out in private and not in government-owned plants. However some plastic production was entirely reserved for the war effort.

Petroleum refining dropped off considerably in September and continued to fall in the early part of October, then turned upward again and in the latter part of the month runs to stills were back close to the highs reached in August. Steel mills, however, while making some recovery in the latter half of September, dropped back again in October. What has happened in the steel industry can hardly be regarded as establishing a trend. Temporary conditions have curtailed production. Demand for steel is active and in all probability operations at the mills soon will move upward. In fact the break in the Federal Reserve Board index for all production seems to be due partly to delays in reconversion and work stoppages and not entirely to an adjustment from wartime to peacetime levels.

Producers of superphosphate have been able to make progress in a cumulation of stocks. The September output was more than 20 percent above that for the corresponding month last year but was more than 6 percent below the record output reported for August.

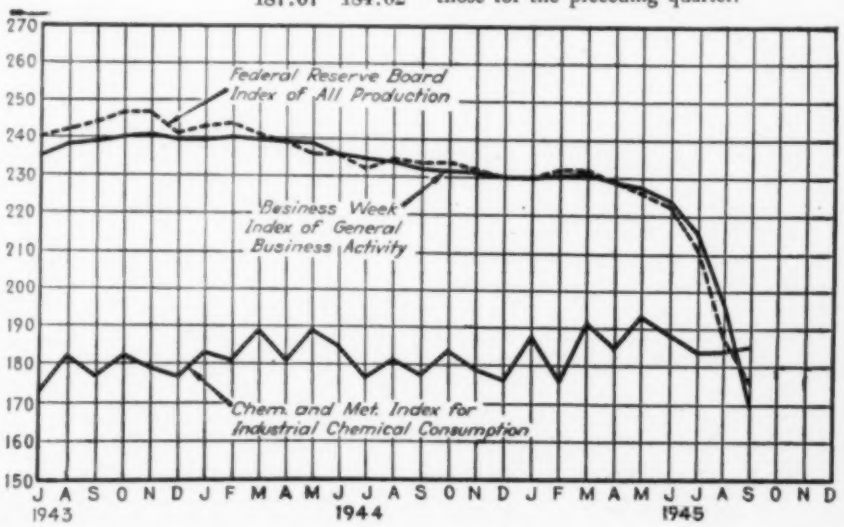
The position of chemicals and related products as reported by the Federal Reserve Board has followed the pattern set by general industry as the index fell from 321 in April to 261 in August but moved against the trend in September when it advanced to 307. Industrial chemicals, for which the Board maintains a separate index, reached the high for the year in June when the number was 412. It fell slightly in July, then broke to 368 for August and 358 for September. Although classified as industrial chemicals, this grouping includes many chemicals which went directly into war products and the indicated loss in production figures may be accounted for by the elimination of these wartime outlets.

Demand for chemicals in the soap-making field has failed to improve which means that it has been dropping throughout the year to date. Not including liquid soaps, deliveries, as reported by producers representing about nine-tenths of the industry, were 12.8 percent lower in the third quarter than in the second quarter. For the first three-quarters, deliveries were 2,218,256,000 lb. or a loss of 8.6 percent as compared with those for the corresponding period of last year. The record of liquid soaps is more favorable as deliveries in the third quarter rose by 26.4 percent over those for the preceding quarter.

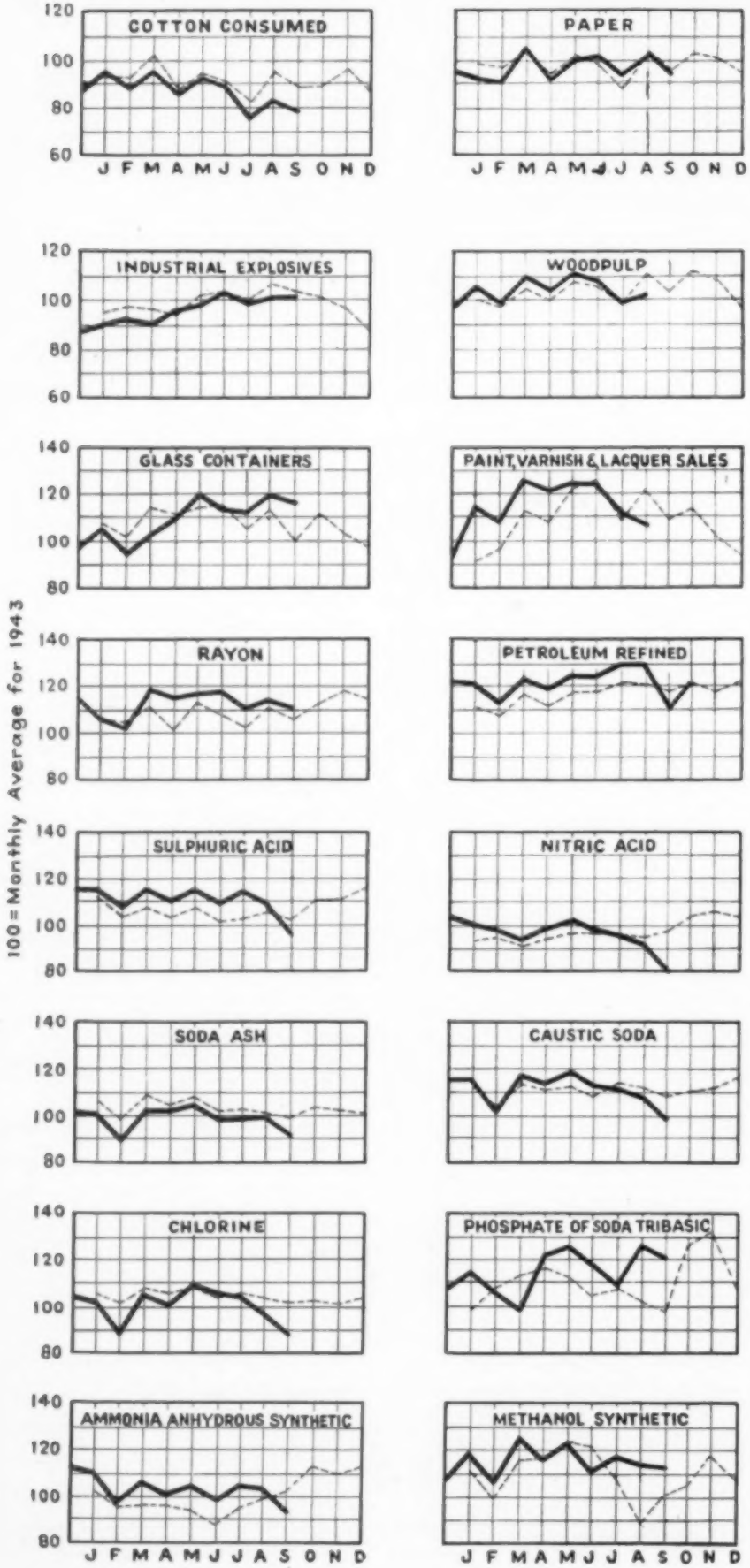
Chem & Met Index for Industrial Consumption of Chemicals

1935 = 100

	Aug. revised	Sept.
Fertilizers	43.90	41.04
Pulp and paper	19.70	18.90
Petroleum refining	20.42	17.03
Glass	19.95	20.05
Paint and varnish	16.58	16.00
Iron and steel	10.78	10.57
Rayon	18.15	17.65
Textiles	10.12	9.56
Coal products	9.44	9.00
Leather	4.30	4.35
Industrial explosives	5.53	5.57
Rubber	3.00	7.80
Plastics	5.20	6.50
	187.07	184.02



PRODUCTION AND CONSUMPTION TRENDS



THE MANY announcements recently made regarding plans for new plants and for expansion of existing plant facilities in fields connected with chemical manufacture, perhaps offer the best indication of the direction in which the chemical industry is headed. However, they point more to the long-time trend. In the meantime readjustment problems of different kinds have obscured the outlook and have been largely responsible for the declining trend which has marked production in the last few months. In those branches where these problems have been less prominent, activities have been high enough to warrant belief that the general level of business will remain relatively high.

Currently all trends are influenced by the necessity for converting from a wartime to a peacetime economy. The closing of large wartime plants is followed by a somewhat corresponding fall in production and consumption of a varied line of raw materials and finished products. Outside factors have tended to accentuate the rate of decline. Yet there are indications that peacetime industries will make up for some of the loss incurred in the closing of war production. For instance, production data for chemicals show that cuts in outputs were far from general. The pigment and dry color fields report an extension of productive activities in September with good gains over the August totals in such products as basic carbonate of lead, barium sulphate, and chrome colors. Chemicals which were produced in larger volume in September included phosphoric acid, calcium phosphate, bichromates, sodium hydrosulphite, anhydrous sodium sulphate, glaubers salt, and sulphur dioxide. Sulphuric acid production was down for the month by about 15 percent and other heavy chemicals such as nitric and hydrochloric acids, soda ash, caustic soda and chlorine likewise were turned out in a smaller way.

Textile production has been beset with many difficulties of late with strikes closing some northern mills and adding to the curtailment of outputs. A favorable side is seen in the expected increase of products which require synthetic fibers in their manufacture.

Glass plants have not been free from labor troubles but latest figures for outputs do not indicate much change in the rate of activities. Glass container output fell off a little in September but flat glass has been turned out in a much larger way with plate production in September reaching 10,354,000 sq. ft. as compared with 8,966,000 sq. ft. in the preceding month.

Supplies of woodpulp are reported to be adequate but production of pulp dropped in September and the same was true for paper although the percentage rate of operations was reported as higher than in August. Industrial explosives found a larger market in September and if mining operations hold up, the prospective increase in building activities should work in favor of an expanded market for explosives. The building program also is expected to create a record demand for paint and paint-making materials.

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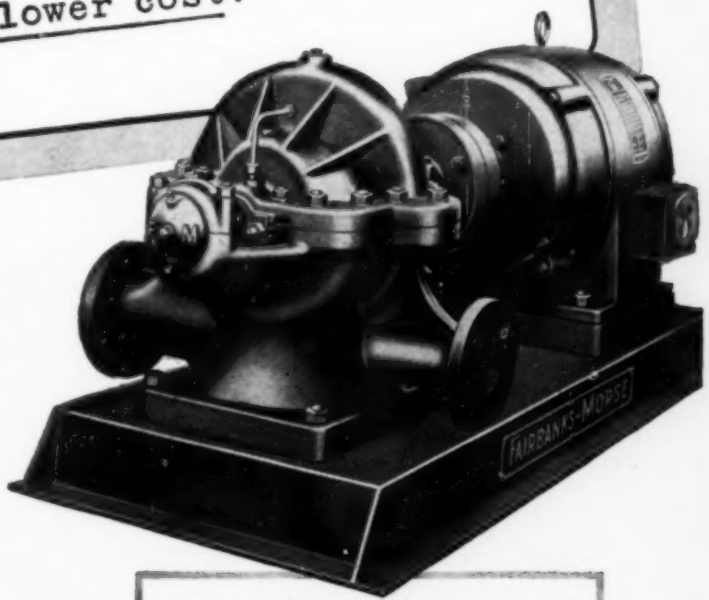

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United States Production of Certain Chemicals

August 1945, August 1944 and Eight-Month Totals for 1945 and 1944

Chemical and Basis	Units	August 1945	August 1944	Total, First 8 Months 1945	Total, First 8 Months 1944
Aluminum chloride:					
Anhydrous & crystal (100% $AlCl_3$)	M lb.	4,391	4,875	39,935	39,034
Solution (32° Be')	M lb.	988	957	7,801	6,801
Ammonia, synthetic anhydrous (100% NH_3)[1]	Tons	46,787	44,931	376,923	346,120
Ammonium chloride (100% NH_4Cl)	M lb.	5,953	4,357	43,986	37,494
Barium sulphate (100% $BaSO_4$)	M lb.	3,049	5,054	36,445	38,798
Bleaching powder (35–37% avail. Cl_2)	M lb.	1,699	3,426	18,146	37,202
Calcium acetate (80% $Ca(C_2H_3O_2)_2$)	M lb.	730	856	5,155	7,497
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M lb.	4,582	8,228	19,804	34,508
Calcium hypochlorite (70% avail. Cl_2)	M lb.	1,281	1,180	10,245	9,329
Calcium phosphate: monobasic (100% $CaH_4(PO_4)_2$)	M lb.	4,525	5,999	40,016	39,754
Dibasic (100% $CaHPO_4$)	M lb.	5,110	2,937	29,610	35,228
Carbon, activated	M lb.	5,026	5,170	41,435	40,828
Carbon black (channel): rubber grade	M lb.	45,954	31,811	316,886	245,734
Other grades	M lb.	2,786	2,571	21,304	18,098
Chlorine	Tons	97,645	104,074	826,828	847,455
Chrome green (C.P.)	M lb.	500	426	3,805	4,036
Chrome yellow & orange (C.P.)	M lb.	3,274	3,131	26,322	22,999
Hydrochloric acid (100% HCl)	Tons	33,882	31,519	248,335	242,236
Hydrogen peroxide (100 vols.)	M lb.	2,651	2,233	21,220	18,447
Iron blue	M lb.	694	730	6,164	6,035
Lamp black	M lb.	1,219	1,058	10,036	9,595
Lead oxide: red (C.P.)	M lb.	8,253	8,229	75,690	69,335
Yellow (C.P.)	M lb.	29,511	25,376	223,444	204,100
Methanol, synthetic (100% CH_3OH)	M gal.	6,169	4,849	50,665	47,980
Nitric acid (100% HNO_3)	Tons	37,088	38,471	316,410	306,132
Phosphoric acid (50% H_3PO_4)	Tons	57,952	52,255	453,778	474,433
Potassium bichromate & chromate (100%)	M lb.	447	477	4,385	5,110
Potassium hydroxide (100% KOH)	Tons	4,665	3,771	36,141	29,167
Soda ash (commercial sodium carbonate):					
Ammonia-soda process (98–100% Na_2CO_3):					
Total wet & dry[2]	Tons	363,802	368,833	2,925,271	3,050,623
Finished light[3]	Tons	188,086	194,278	1,502,506	1,659,418
Finished dense	Tons	120,680	124,120	933,799	973,721
Natural	Tons	15,865	15,897	122,882	118,675
Sodium bicarbonate (100% $NaHCO_3$)	Tons	14,593	12,112	111,415	106,555
Sodium bichromate & chromate (100%)	Tons	6,537	6,378	52,996	55,305
Sodium bisulphite (100% $NaHSO_3$)	M lb.	3,326	3,859	24,344	27,633
Sodium hydrosulphide (100% NaSH)	M lb.	2,250	2,130	17,669	17,743
Sodium hydrosulphite (100% $Na_2S_2O_4$)	M lb.	2,767	3,352	24,971	28,091
Sodium hydroxide (100% NaOH):[4] electrolytic process:					
Liquid	Tons	92,057	101,776	783,729	801,808
Solid	Tons	17,786	.....	149,977	.....
Lime-soda process:					
Liquid	Tons	60,261	57,507	492,644	454,256
Solid	Tons	19,947	.....	161,812	.....
Sodium phosphate: monobasic (100% NaH_2PO_4)	Tons	1,336	2,539	9,957	19,561
Dibasic (100% Na_2HPO_4)	Tons	5,574	4,763	39,775	37,133
Tribasic (100% Na_3PO_4)	Tons	7,637	6,193	55,748	52,197
Meta (100% $NaPO_3$)	Tons	2,227	2,436	17,691	17,742
Tetra (100% Na_4P_2O)	Tons	3,905	3,231	26,401	26,173
Sodium silicate (anhydrous)	Tons	34,906	34,380	300,427	276,251
Sulphuric acid (100% H_2SO_4):[5] chamber process	Tons	260,756	260,777	2,145,695	2,129,378
Net contact process[6]	Tons	469,438	443,256	3,870,904	3,476,747
White lead: basic lead carbonate	Tons	3,266	.....	26,953	.....
Basic lead sulphate	Tons	1,028	.....	7,881	.....
Zinc yellow (zinc chromate)	Tons	1,159	.....	12,251	.....

Data for this tabulation have been taken from the "Facts for Industry" series issued by Bureau of the Census and WPB Chemicals Bureau. Production figures represent primary production and do not include purchased or transferred material. Quantities produced by government-owned arsenals, ordnance works and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. [1] Includes a small amount of aqua ammonia. [2] Total wet and dry production including quantities diverted for manufacture of caustic and bicarbonate, and quantities processed to finished light and finished dense. [3] Not including quantities converted to finished dense. [4] Data collected in cooperation with Bureau of Mines. [5] Figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. [6] Includes oleum grades; excludes spent acid.

United States Production of Certain Synthetic Organic Chemicals

August 1945, August 1944 and Eight-Month Totals for 1945 and 1944

Item	August 1945	August 1944	Total, First 8 Months 1945	Total, First 8 Months 1944
Acetanilide, technical and U. S. P.	603,560	181,486	*3,606,725	†3,077,963
Acetic acid, synthetic[1]	21,271,109	23,355,074	183,617,065	194,666,000
Acetic acid, natural[2]	2,551,009	3,176,373	23,376,778	26,934,531
Acetic anhydride[3]	42,728,754	41,361,179	359,395,988	324,505,788
Acetylsalicylic acid, aspirin	814,794	737,690	7,010,959	6,016,456
n-Butyl acetate	6,444,972	5,804,876	46,666,123	49,103,319
Creosote oil, tar distillers[4]	9,296,172	9,006,557	86,493,039	82,929,902
Creosote oil, byproduct[5, 6]	2,822,208	3,434,307	24,590,209	26,790,520
Cresols, meta-para[7]	912,578	526,596	5,419,126	4,573,352
Cresols, ortho-meta-para[7]	695,690	1,154,520	†6,198,444	6,661,522
Cresylic acid, crude	2,104,510	2,489,407	18,077,056	17,085,069
Cresylic acid, refined[7]	2,539,407	3,432,460	19,979,431	27,876,658
Diethyl ether	5,439,336	5,088,509	60,432,104	40,393,515
Ethyl acetate	10,970,046	9,074,118	78,467,596	70,614,082
Methyl chloride, all grades	2,383,600	2,132,859	20,005,672	14,854,554
Naphthalene, coke-oven operators[5, 8, 9]	7,242,143	8,340,395	60,277,094	69,385,993
Naphthalene, tar distillers[4, 9, 9]	17,730,597	18,540,507	135,333,694	130,823,105
Naphthalene, refined[10]	5,574,731	6,122,595	47,092,376	57,640,642
Oxalic acid, technical	1,650,707	1,337,471	13,560,325	11,650,135
Phenobarbital and sodium salts	15,264	11,924	185,291	158,961
Phthalic anhydride	11,283,743	10,600,197	89,243,222	81,455,504
Sulfa drugs, total[11]	459,565	158,686	3,880,362	3,365,241

All data in pounds except creosote oil (gal.) Statistics collected and compiled by U. S. Tariff Commission except where noted. [1] Excludes statistics on recovered acid which are confidential. [2] Acid produced by direct process from wood and from calcium acetate. [3] All acetic anhydride including that from acetic acid by vapor-phase process. [4] Product of distillers who use purchased coal tar only. [5] Product of byproduct coke-oven operators only. [6] Statistics collected and compiled by Bureau of Mines. [7] Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. [8] Statistics combine three grades: solidifying at less than 74 deg. C.; 74 to less than 76; 76 to less than 79. [9] Statistics represent production for sale only for less than 74 grade; for other two grades they represent for sale and for consumption within producing plant. [10] 79 deg. C. and over. [11] Includes data for acetylsulfathiazole, both as drug and intermediate, resulting in appreciable unavoidable duplication. * Six-month total, figures for two months were confidential. † Seven-month total.

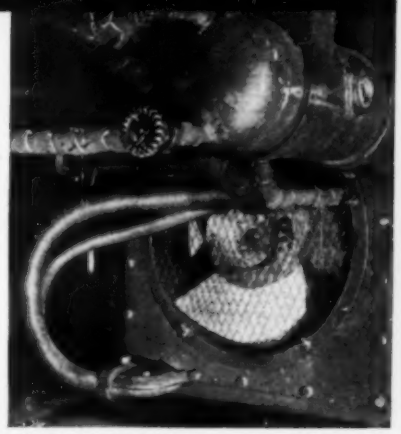
Flexible CONNECTIONS for *Postwar* PRODUCTS

Are you planning to manufacture new products or equipment in which gas... steam...oil or other fluids are conveyed through moving connections?

Then prevent such connections becoming trouble spots. Make adequate allowance for misalignment, movement, vibration...with connections of American Flexible Metal Hose or Seamless Flexible Metal Tubing.

Whatever may be the conditions of pressure, temperature, chemical, mechanical or abrasive action involved, a thoroughly dependable and durable "American" assembly can be engineered to fully meet your requirements.

For detailed information, write for Publication SS-50.



REFRIGERANT LINES on this railway air conditioning unit must withstand abuse and vibration, and still remain pressure-tight. American Seamless meets these requirements, and permits unit to be rolled out for frequent inspection.

Buy VICTORY BONDS...Help assure World Peace

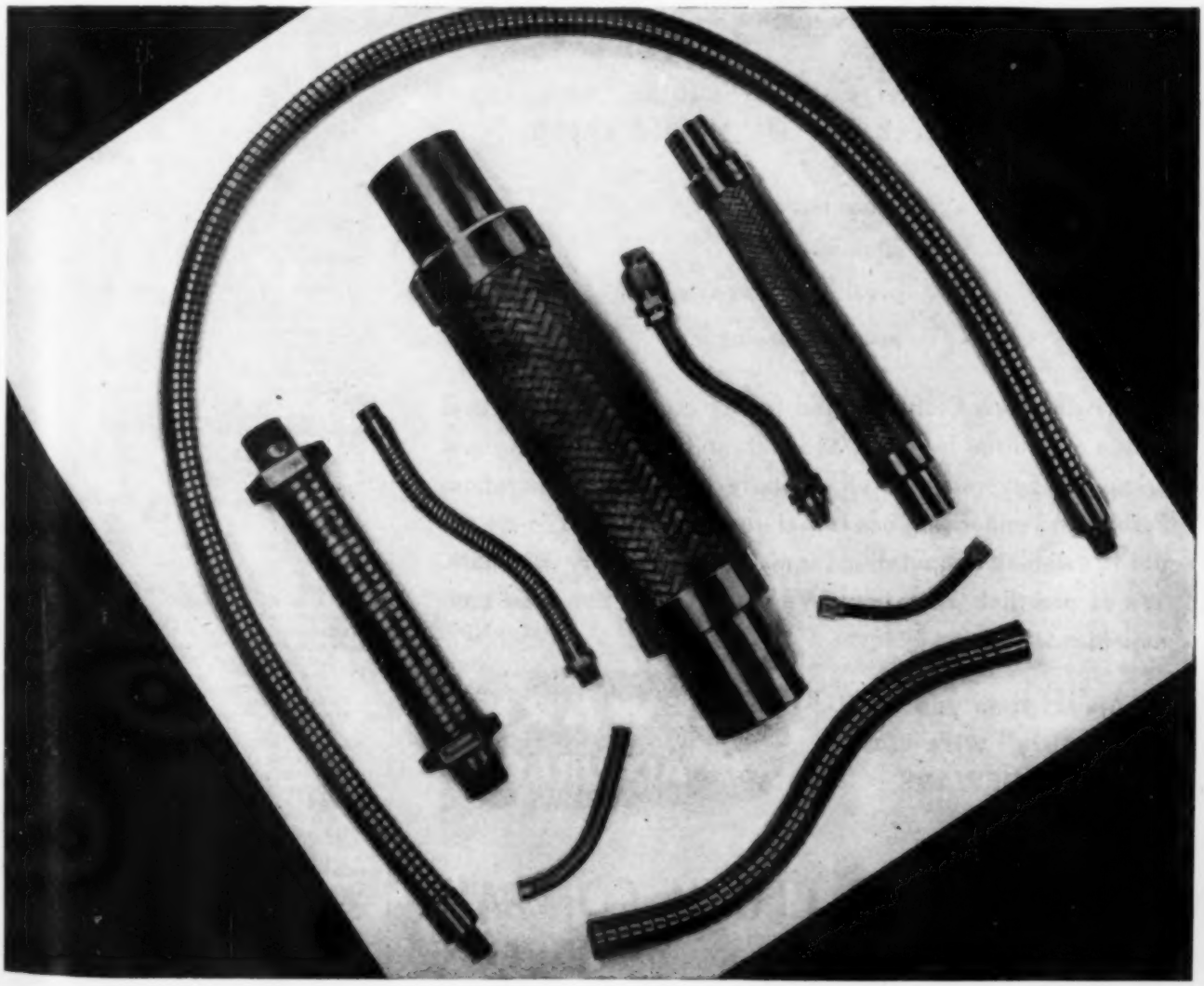
ANACONDA

American Metal Hose

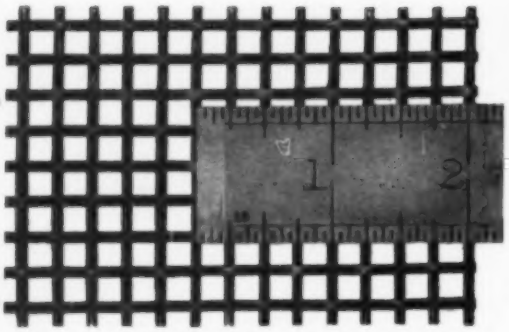
AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut • *Subsidiary of Anaconda Copper Mining Company*

In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

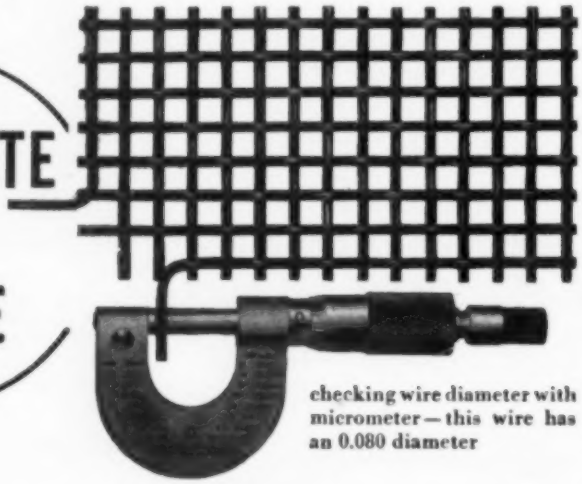


ACCURATE *in* MESH



checking a 4 x 4 mesh cloth, center to center of wire

ACCURATE *in* GAUGE



checking wire diameter with micrometer—this wire has an 0.080 diameter

Every buyer of wire cloth should make spot checks of his purchase. He should check:

1 . . . **diameter of wire**

2 . . . **mesh count**

3 . . . **precision of weaving**

4 . . . **proper crimping**

NEWARK Wire Cloth is noted for its accuracy in mesh and gauge and in the precision and uniformity of its weaving and crimping. Several factors contribute toward this reputation. Perhaps the underlying one is that years ago—in 1877—we set out to establish a reputation for making high quality wire cloth. We earned that reputation. We feel that it is but good business to maintain it.

The next time you want "quality" wire cloth, try NEWARK.

NEWARK *for* ACCURACY

NEWARK WIRE CLOTH COMPANY

350 VERONA AVENUE **NEWARK 4, N. J.**

CHEM. & MET.

Weighted Index of Prices for CHEMICALS

Base = 100 for 1937

This month	**108.78**
Last month	108.72
November, 1944	108.81
November, 1943	109.54

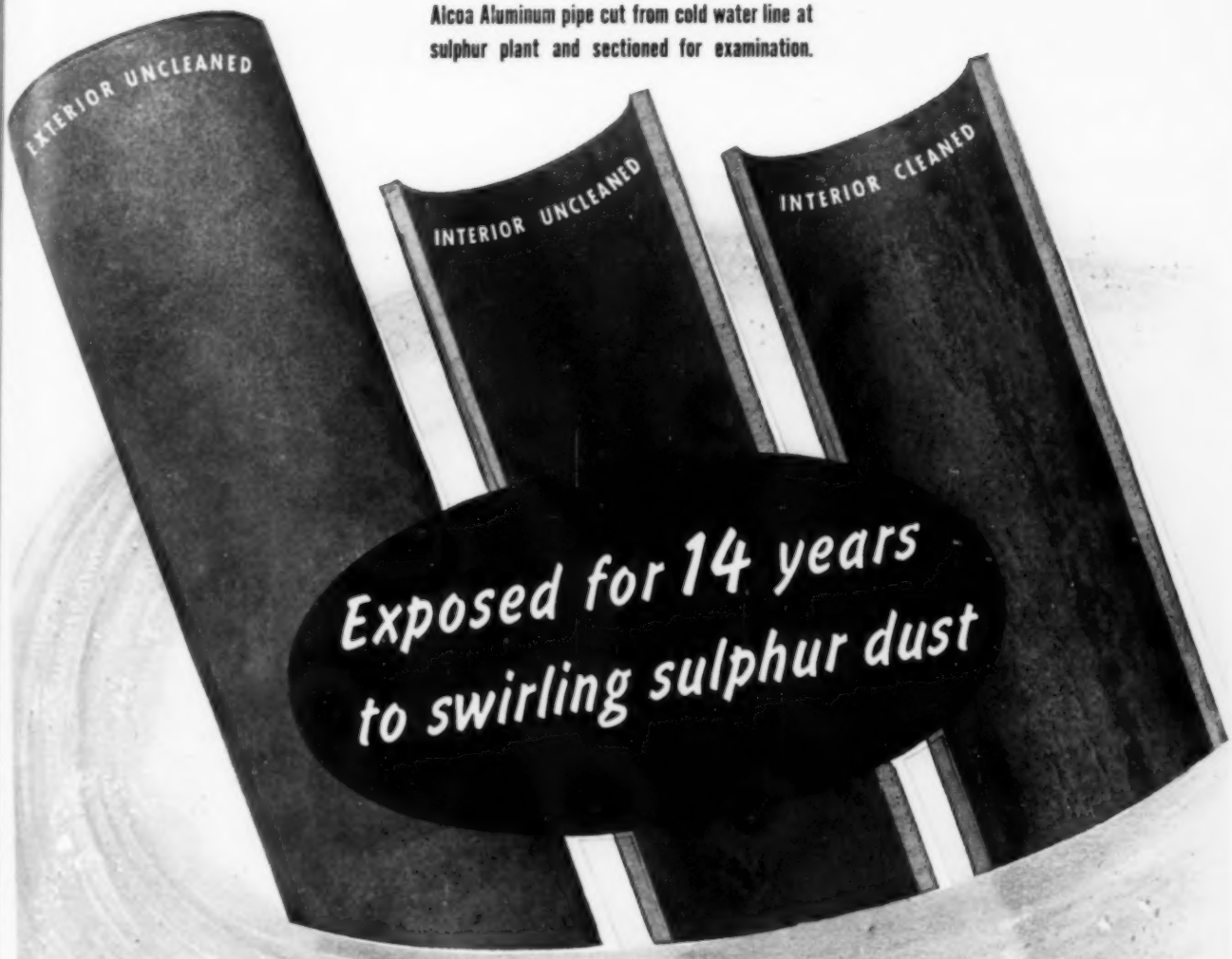
CURRENT PRICES

The accompanying prices refer to round lots. Where it is trade custom to sell f.o.b. works, quotations are so designated. Prices are corrected to November 14

INDUSTRIAL CHEMICALS

Acetone, tanks, lb.	$0.06 –
Acid, acetic, 28%, bbl., 100 lb.	3.38 – $3.63
Boric, bbl., ton	109.00 – 113.00
Citric, kegs, lb.	.20 – .23
Formic, cbys., lb.	.10½ – .11
Hydrofluoric, 30%, drums, lb.	.08 – .085
Lactic, 44%, tech., light, bbl., lb.	.073 – .075
Muriatic, 18°, tanks, 100 lb.	1.05 –
Nitric, 36°, carboys, lb.	.05 – .05½
Oleum, tanks, wks., ton	18.50 – 20.00
Oxalic, crystals, bbl., lb.	11½ – 12½
Phosphoric tech., tanks, lb.	.04 –
Sulphuric, 60°, tanks, ton	13.00 –
Tartaric, powd., bbl., lb.	.70½ –
Alcohol, amyl	–
From pentane, tanks, lb.	.13½ –
Alcohol, butyl, tanks, lb.	.10½ – .18½
Alcohol, ethyl, denatured, 190 proof	–
No. 1 special, tanks, gal., wks.	.50 –
Alum, ammonia, lump, lb.	.04½ –
Aluminum sulphate, com. bags 100 lb.	1.15 – 1.40
Ammonia, anhydrous, cyl., lb.	.14½ –
tanks, ton	59.00 – 69.00
Ammonium, carbonate, powd., casks, lb.	.09½ – .10
Sulphate, wks., ton	28.20 –
Amyl acetate, tech., from pentane, tanks, lb.	.14½ –
Aqua ammonia, 26°, drums, lb.	.02½ .03
tanks, ton	65.00 –
Arsenic, white, powd., bbl., lb.	.04 – .04½
Barium carbonate, bbl., ton	65.00 – 75.00
Chloride, bbl., ton	75.00 – 78.00
Nitrate, casks., lb.	.09½ – .11
Blanc fix, dry, bags, ton	60.00 – 70.00
Bleaching powder, f.o.b., wks., drums, 100 lb.	2.50 – 3.00
Borax, gran., bags 100 lb.	45.00 –
Calcium acetate, bags, 100 lb.	3.00 –
Arsenate, dr., lb.	.07½ – .08
Carbide, drums, ton	50.00 –
Chloride, flake, bags, del., ton	18.50 – 25.00
Carbon bisulphide, drums, lb.	.05 – .05½
Tetrachloride, drums, gal.	.73 – .80
Chlorine, liquid, tanks, wks., 100 lb.	1.75 – 2.00
Copperas, bgs., f.o.b., wks., ton	17.00 – 18.00
Copper carbonate, bbl., lb.	.19½ – .20
Sulphate, bbl., 100 lb.	5.00 – 5.50
Cream of tartar, bbl., lb.	.57 –
Diethylene glycol, dr., lb.	.14½ – .15½
Epsom salt, dom., tech., bbl., 100 lb.	1.80 – 2.00
Ethyl acetate, tanks, lb.	.107 –
Formaldehyde, 40%, tanks, lb.	.032 –
Furfural, tanks, lb.	.09½ –
Glaubers salt, bags, 100 lb.	1.05 – 1.10
Glycerine, c.p., drums, extra, lb.	.17½ .17½
Lead:	
White, basic carbonate, dry, casks, lb.	.08½ –
Red, dry, sck., lb.	.09½ –
Lead acetate, white crys., bbl., lb.	.12½ – .13
Lead acetate, powd., bag, lb.	.11½ – .12
Lithopone, bags, lb.	.04½ – .04½
Magnesium carb., tech., bags, lb.	.07½ – .08
Methanol, 95%, tanks, gal.	.60 –
Synthetic, tanks, gal.	.24 –
Phosphorus, yellow, cases, lb.	.23 – .25
Potassium bichromate, casks, lb.	.10½ – .10½
Chlorate, pwd., lb.	.09½ – .12
Hydroxide (c'stic potash) dr., lb.	.07 – .07½
Muriate, 60%, bags, unit	.53½ –
Nitrate, ref., bbl., lb.	.08 – .09
Permanganate, drums, lb.	.19½ – .20
Prussiate, yellow, casks, lb.	.16 – .17
Sal ammoniac, white, casks, lb.	.05 15 – .06
Salsoda, bbl., 100 lb.	1.00 – 1.05
Salt cake, bulk, ton	15.00 –
Soda ash, light, 58%, bags, contract, 100 lb.	1.05 –
Dense, bags, 100 lb.	1.15 –
Soda, caustic, 76% solid, drums, 100 lb.	2.30 – 3.00
Acetate, del., bbl., lb.	.05½ – .06
Bicarbonate, bbl., 100 lb.	1.70 – 2.00
Bichromate, bags, lb.	.07½ – .08
Bisulphate, bulk, ton	16.00 – 17.00
Bisulphite, bbl., lb.	.03 – .04

Alcoa Aluminum pipe cut from cold water line at sulphur plant and sectioned for examination.



"in excellent condition," is report

Several hundred feet of 3-inch aluminum pipe were installed in 1930, in an open trench, to carry cold water across a sulphur storage yard. It was exposed continuously to sulphur dust and, whenever the ground was wet, to slightly acid water. Tough service for some materials, but easy on aluminum . . . as you can see.

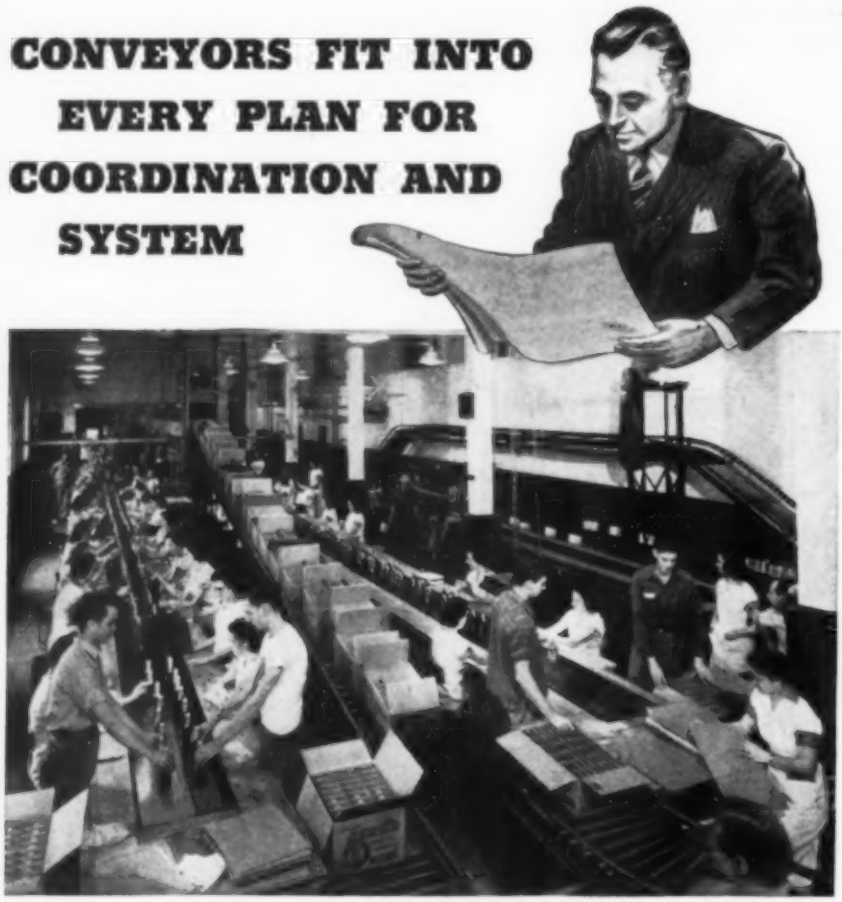
Taken out of service after fourteen years, Alcoa had a chance to examine the pipe microscopically. On the outside, there was no appreciable attack. On the inside, the *maximum* depth of attack was 0.0280", or two thousandths of an inch per year. "Good for many more years of service".

There are many places where Alcoa Aluminum Alloys are the answer to the designer's problems. May we help you determine the facts in connection with your equipment? ALUMINUM COMPANY OF AMERICA, 2151 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

CONVEYORS FIT INTO EVERY PLAN FOR COORDINATION AND SYSTEM



...WITH THE *Plus* OF *FAST* LOW-COST HANDLING

Conveyors are an important weapon in your war on waste and inefficiency. They contribute substantially to the elimination of disorder and confusion—congestion—working hazards.

When you plan for faster, better organized production — check your plan thoroughly on the score of conveying and conveyors.

Why not check with Standard Conveyor—builders of an unusually wide variety of conveying equipment including power and gravity conveyors in belt, roller, chain and slat types, spiral chutes, piling and lifting machines, pneumatic tube systems.

Whether commodities — boxes, cartons, parts, units, packages—have to be moved in a straight line, a curve, up, down, or across, there is Standard equipment to do the job developed in more than 40 years of service to business and industry.

Write for valuable reference book "Conveyors by Standard," Catalog No. CM-115.

STANDARD CONVEYOR CO.

General Offices: North St. Paul 9, Minn.

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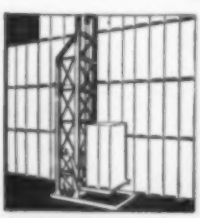


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

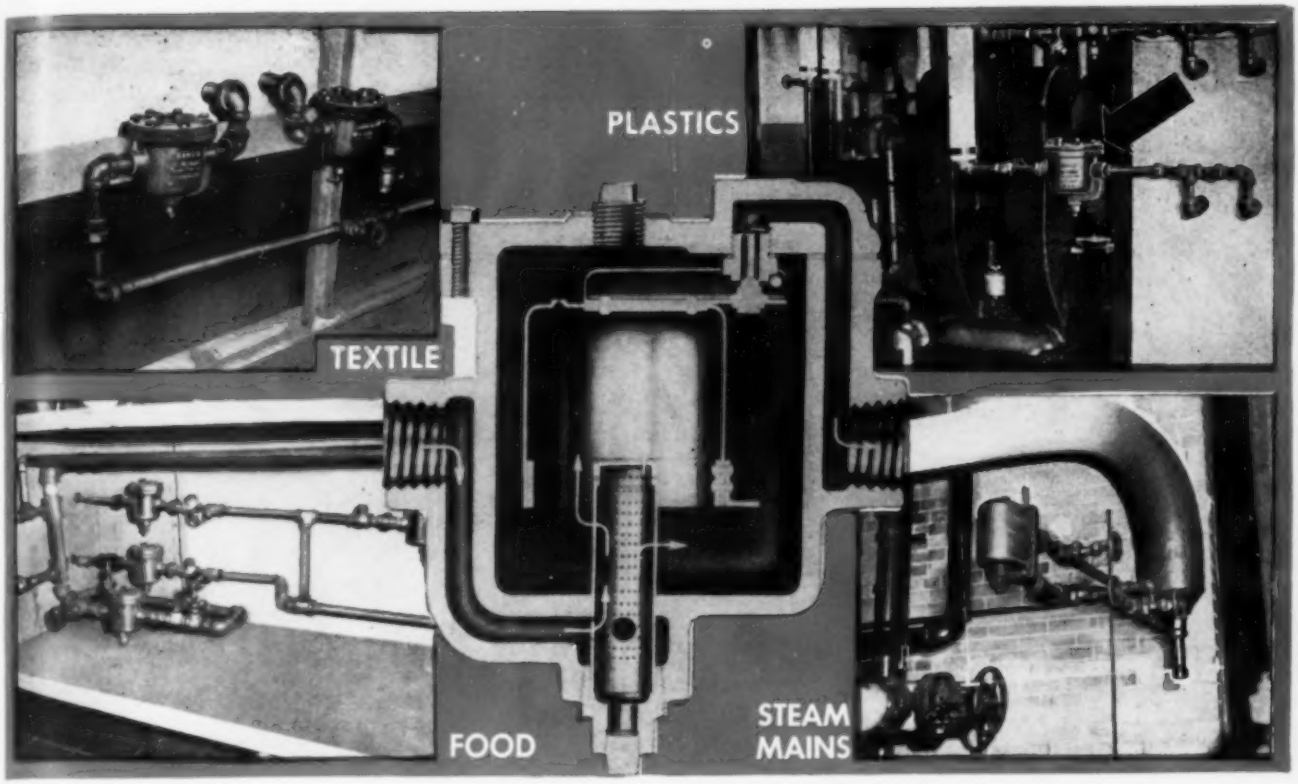
PNEUMATIC TUBE SYSTEMS

CHEM. & MET.
Weighted Index of Prices for OILS & FATS

Base = 100 for 1937

This month	145.63
Last month	145.63
November, 1944	145.58
November, 1943	145.24

Chlorate, kegs, lb.	$0.06½–	$0.06½
Cyanide, cases, dom., lb.	.14½–	.15
Fluoride, bbl., lb.	.07 –	.08
Hyposulphite, bags, 100 lb.	2.25 –	2.50
Metasilicate, bbl., 100 lb.	2.50 –	2.65
Nitrate, bulk, ton	27.00 –	.....
Nitrite, casks, lb.	.06½–	.07
Phosphate, tribasic, bags, 100 lb.	2.70 –	.....
Prussiate, yel., bags, lb.	.10½–	.11
Silicate, 40°, dr., wks., 100 lb.	.80 –	.85
Sulphite, crys., bbl., lb.	.02½–	.02½
Sulphur, crude at mine, long ton	16.00 –	.....
Dioxide, cyl., lb.	.07 –	.08
Dioxide, tanks, lb.	.04 –	.....
Tin crystals, bbl., lb.	.39½–	.....
Zinc chloride, grain, bbl., lb.	.05½–	.06
Oxide, lead free, bags, lb.	.07½–	.....
Oxide, 5% leaded, bags, lb.	.07½–	.....
Sulphate, bbl., cwt.	3.85 –	4.00
OILS AND FATS		
Castor oil, No. 3 bbl., lb.	$0.13½–	$0.14½
Chinawood oil, tanks, lb.	.38½–	.....
Coconut oil, ceylon, N.Y., lb.	.0885–	.....
Corn oil crude, tanks (f.o.b. mill), lb.	.12½–	.....
Cottonseed oil crude (f.o.b. mill), tanks, lb.	.12½–	.....
Linseed oil, raw, car lots, bbl., lb.	.155–	.....
Palm, casks, lb.	.0865–	.....
Peanut oil, crude, tanks (mill), lb.	.12½–	.....
Rapeseed oil, refined, bbl., lb.	nom.	.....
Soybean, tanks, lb.	.11½–	.....
Menhaden, light, pressed, dr. lb.	.13 –	.....
Crude, tanks (f.o.b. factory) lb.	.089–	.....
Grease, yellow, loose, lb.	.08½–	.....
Oleo stearine, lb.	.09½–	.....
Oleo oil, No. 1, lb.	.11½–	.....
Red oil, distilled, bbl., lb.	.13 –	.....
Tallow extra, loose, lb.	.08½–	.....
COAL-TAR PRODUCTS		
Alpha-naphthol, crude, bbl., lb.	$0.52 –	$0.55
Alpha-naphthylamine, bbl., lb.	.32 –	.34
Aniline oil, drums, extra, lb.	.11½–	.12½
Aniline salts, bbl., lb.	.22 –	.24
Benzaldehyde, tech., dr., lb.	.45 –	.50
Benzidine base, bbl., lb.	.70 –	.75
Benzoic acid, USP, kegs, lb.	.54 –	.56
Benzol, 90%, tanks, works, gal.	.15 –	.....
Benzyl chloride, tech., dr., lb.	.22 –	.24
Beta-naphthol, tech., drums, lb.	.23 –	.24
Cresol, USP, dr., lb.	.10½–	.....
Cresylic acid, dr., wks., gal.	.81 –	.83
Diphenyl, bbl., lb.	.15 –	.....
Diethylaniline, dr., lb.	.40 –	.45
Dinitrotoluol, bbl., lb.	.18 –	.19
Dinitrophenyl, bbl., lb.	.22 –	.23
Dip oil, 15%, dr., gal.	.23 –	.25
Diphenylamine, dr., f.o.b. wks., lb.	.25 –	.....
H acid, bbl., lb.	.45 –	.50
Hydroquinone, bbl., lb.	.90 –	.....
Naphthalene, flake, bbl., lb.	.07 –	.07½
Nitrobenzene, dr., lb.	.08 –	.09
Para-cresol, bbl., lb.	.41 –	.....
Para-nitraniline, bbl., lb.	.47 –	.49
Phenol, USP, drums, lb.	.10 –	.11
Picric acid, bbl., lb.	.35 –	.40
Pyridine, dr., gal.	1.55 –	1.60
Resorcinol, tech., kegs, lb.	.65 –	.70
Salicylic acid, tech., bbl., lb.	.26 –	.33
Solvent naphtha, w.w., tanks, gal.	.26 –	.....
Toludin, bbl., lb.	.96 –	.98
Toluol, drums, works, gal.	.32 –	.....
Xylol, com., tanks, gal.	.25 –	.....
MISCELLANEOUS		
Casein, tech., bbl., lb.	$0.21 –	$0.24
Dry colors		
Carbon gas, black (wks.), lb.	.0365–	.097
Prussian blue, bbl., lb.	.36 –	.37
Ultramarine blue, bbl., lb.	.11 –	.26
Chrome green, bbl., lb.	.23 –	.33
Carmine, red, tins, lb.	4.60 –	4.75
Para toner, lb.	.75 –	.80
Vermilion, English, bbl., lb.	2.50 –	2.60
Chrome, yellow, C.P., bbl., lb.	.16 –	.17
Gum copal, Congo, bags, lb.	.09 –	.55
Manila, bags, lb.	.09 –	.15
Damar, Batavia, cases, lb.	.10 –	.22
Kauri, cases, lb.	.18 –	.60
Magnesite, calc., ton	64.00 –	.....
Pumice stone, lump, bbl., lb.	.05 –	.07
Rosin, H., 100 lb.	7.43 –	.....
Shellac, orange, fine, bags, lb.	.46 –	.....
Bleached, bonedry, bags, lb.	.42 –	.....
T. N. bags, lb.	.35 –	.....
Turpentine, gal.	.92½–	.....



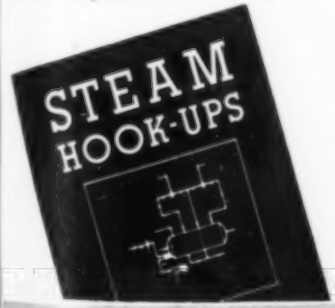
WHERE SHOULD A BUCKET STEAM TRAP BE USED?

You can't standardize on one type of trap for any plant—successfully. But for the applications illustrated above, the Sarco Bucket Trap is eminently successful. The textile dryer, the plastics press, the hot plates in a hospital, and the main steam line drain, all call for intermittent ejection of condensate in large volumes—and fast. Thousands are in service also in laundries, refineries and on heat exchangers and other power plant equipment.

The Sarco Bucket Trap has a straight through connection and a built-in strainer. Easily piped in minimum space and at low cost. All mechanism is on the cover. Can be inspected without disturbing connections. Standard sizes up to 250 lbs. Forged steel types to 900 lbs. Ask for Bulletin No. 350.

Use the Sarco Bucket Trap only where it belongs. We make three other types and can fit the trap to the job. They are blood relations—work together well in any combination.

The Sarco Hook-Up book shows when and how to use all types of steam traps and temperature control.



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FOUR STARS ON OUR E PENNANT TESTIFY TO SARCO PERFORMANCE IN THE WAR EFFORT

ARMY E NAVY

SARCO SAVES STEAM

Represented in Principal Cities

SARCO COMPANY, INC., 475 FIFTH AVE., NEW YORK 17, N.Y • Sarco Canada, Ltd., 85 Richmond St., W., Toronto 1, Ont.

NEW CONSTRUCTION

	Current Projects		Cumulative 1945	
	Proposed Work	Contracts	Proposed Work	Contracts
New England	$75,000	$200,000	$3,325,000	$16,804,000
Middle Atlantic	3,540,000	2,205,000	9,102,000	33,621,000
South	31,000,000	.....	50,338,000	34,357,000
Middle West	290,000	656,000	12,039,000	61,957,000
West of Mississippi	2,100,000	1,000,000	85,812,000	91,850,000
Far West	14,100,000	497,000	20,145,000	11,945,000
Canada	450,000	.....	9,219,000	3,331,000
Total	$51,555,000	$4,558,000	$189,980,000	$253,865,000

PROPOSED WORK

Calif., Berkeley—Colgate-Palmolive-Peet Co., 810 Carlton St., plans to construct a 5 story factory building. Estimated cost $1,000,000.

Calif., El Segundo—Standard Oil Co. of California, 605 West Olympic Blvd., Los Angeles, plans to expand its refinery facilities here. Estimated cost $13,000,000.

Calif., Sacramento—Valley Paper Co., 1131 Front St., plans to construct a new warehouse and distributing center. Estimated cost $100,000.

Mass., Arlington—Frost Insecticide Co., 24 Mill St., plans to construct a 2 story 30x150 ft. warehouse addition. Louis Warren Ross, 20 Kilby St., Boston, Archt. Estimated cost $75,000.

Mo., St. Louis—Monsanto Chemical Co., 1700 South Second St., plans to construct a synthetic caffeine plant. Estimated cost $1,500,000.

N. J., Burlington—Hercules Powder Co., Wilmington, Del., plans to construct a plant here for the manufacture of organic chemicals and resin. Estimated cost $1,500,000.

N. J., Camden—General Chemical Co., 40 Rector St., New York, N. Y., plans to construct a silicate furnace building.

N. Y., East Greenbush—Winthrop Chemical Co., Inc., Rensselaer, N. Y., plans to construct a research laboratory building. W. Stuart Thompson, 125 East 46th St., New York City, Archt. Estimated cost $2,000,000.

O., Akron—Goodyear Tire & Rubber Co., 1144 East Market St., plans to construct a pilot plant and plastics laboratory building. J. Gordon Turnbull, Inc., 2630 Chester Ave., Eng. Estimated cost $250,000.

O., Cleveland—C. DeSantis Paint Co., 11530 Broadway, plans to construct a 2 story, 75x100 ft. paint factory at 4101 East 116th St. Estimated cost $40,000.

Tex., Houston—Chipman Chemical Co., Inc., 401 Yale St., plans to enlarge its plant. Estimated cost $100,000.

Tex., Houston—Clampett Paper Co., Navigation Bldg., plans to enlarge its plant. Estimated cost $100,000.

Tex., Houston—Cook Paint & Varnish Co., 1816 Main St., plans to enlarge its plant. Estimated cost $150,000.

Tex., Tuleta—Gasoline Production Corp., Tuleta, plans to construct a recycling plant unit. Estimated cost $250,000.

Va., Ampthill—E. I. du Pont de Nemours & Co., Inc., Richmond, plans to remodel and improve its cellophane plant here. Estimated cost $1,000,000.

Va., Hopewell—Hercules Powder Co., Wilmington, Del., plans to construct additions and improvements to its purified chemical cotton plant. This is part of $30,000,000 expansion plans to be made within the next year.

Ont., Long Branch—Murphy Paint Co., Ltd., 2740 St. Patrick St., Montreal, Que., plans to construct a plant building. Estimated cost $450,000.

CONTRACTS AWARDED

Calif., Los Angeles—Little Craft Plastic Co., 1337 South Oliver St., has awarded the contract for a 2 story factory to A. H. Watson, 7411 South Avalon Blvd. Estimated cost $42,000.

Calif., Los Angeles—Plas-Tex Corp., 653 North Robertson Blvd., has awarded the contract for a 1 story factory and office building at 2501 Military Ave., to Baruch Corp., 625 South Olive St. Estimated cost $80,000.

Conn., New Haven—Rockbestos Products Co., Nicoll St., has awarded the contract for a 2 story factory building to Dwight Building Co., 152 Chapel St. Estimated cost $160,000.

Conn., Rocky Hill—Hartford Rayon Corp., Dividend St., has awarded the contract for a 2 story factory addition to Associated Construction Co., 738 Main St., Bridgeport. Estimated cost $40,000.

Del., North Claymont—General Chemical Co., 40 Rector St., New York, N. Y., has awarded the contract for the construction of a pump house to Rupert Construction Co., 1509 French St., Philadelphia, Pa. Estimated cost $40,000.

Ill., Chicago—F & F Laboratories, 3501 West 48th Pl., has awarded the contract for a factory to L. J. Graf Construction Co., 700 North Michigan Ave. Estimated cost $40,000.

Ill., Chicago—Lubin Bros. Paper Co., 1040 North Halstead St., has awarded the contract for rebuilding its plant to Kadin Construction Co., 30 North La Salle St. Estimated cost $50,000.

Ill., North Chicago—Abbott Laboratories, North Chicago, have awarded the contract for a 3 story factory to W. E. O'Neil Co., 2751 Clybourn Ave., Chicago. Estimated cost $120,000.

Ind., Indianapolis—Sutho Suds Co., 709 Maple Rd., has awarded the contract for a 2 story, 80x167 ft. washing powder factory to A. V. Stackhouse Co., 2611 Winthrop Ave. Estimated cost $75,000.

Ind., Whiting—Standard Oil Co. (Indiana), Whiting, has awarded the contract for the design and construction of a steam and electric generating station at its refinery to Stone & Webster Engineering Corp., 90 Broad St., New York, N. Y.

Md., Baltimore—Brooklyn Chemical Works, Inc., Ninth St., has awarded the contract for a smelting building to Baltimore Contractors, 711 South Central Ave. Estimated cost $1,000,000.

Mich., Monroe—Consolidated Paper Co., Monroe, has awarded the contract for an addition to its paper plant to Christman Co., Lansing. Estimated cost $92,000.

Mo., Sugar Creek—Standard Oil Co., 2 West 40th St., Kansas City, has awarded the contract for a large refinery to M. W. Kellogg Co., 225 Broadway and Foster-Wheeler Corp., 165 Broadway, both New York City.

N. J., Cranford—Johnson & Johnson, 500 George St., New Brunswick, has awarded the contract for the construction of a manufacturing plant here to John A. Johnson Contracting Corp., 268 41st St., Brooklyn, N. Y. Estimated cost $750,000.

N. Y., Niagara Falls—Goodyear Tire & Rubber Co., 1144 East Market St., Akron, O., has awarded the contract for the construction of a plastics plant here to Clemmer Construction Co., 134 East Thornton St., Akron, O.

O., Toledo—Libbey-Owens-Ford Glass Co., Toledo, has awarded the contract for an addition to its technical building to George W. Lathrop & Sons, Inc., 1510 Montana St. Estimated cost $179,000.

Ore., Springfield—Borden Milk Co., Casein Div., 350 Madison Ave., New York, N. Y., has awarded the contract for three buildings to be used for glue factory to O. C. Hart Building Co., 1069 19th Ave., Eugene, Ore. Estimated cost $75,000.

Pa., Philadelphia—Atlantic Refining Co., 260 South Broad St., has awarded the contract for a plant to Lauter Construction Co., 112 South 16th St. Estimated cost $75,000.

Pa., Philadelphia—Publicker Industrial Alcohol Co., 1429 Walnut St., has awarded the contract for the construction of a warehouse to McCloskey & Co., 1620 West Thompson St. Estimated cost $300,000.

Tex., Dallas—Procter & Gamble, 1226 Loomis St., has awarded the contract for an addition to its factory to H. K. Ferguson Co., 25 West 43rd St., New York, N. Y., and Esperson Bldg., Houston. Estimated cost $500,000.

Utah, Devil's Slide—Union Portland Cement Co., 554 South 3rd West St., Salt Lake City, has awarded the contract for additions to its plant here to J. T. McDowell Co., First National Bank Bldg., Denver, Colo. Estimated cost $300,000.